SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects, papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc. refer the University OrdinanceBooklet the various conditions/ provisions pertaining to examinations as prescribed in the following Ordinances-

Ordinance No. 1	:	Enrolment of Students.
Ordinance No.2	:	Admission of Students
Ordinance No. 4	:	National Cadet Corps
Ordinance No. 6	:	Examination in General (relevant extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No.9	:	Conduct of Examinations (Relevant extracts)
Ordinance No.10	:	Providing for Exemptions and Compartments

Ordinance No. 19	:	Admission Candidates to Degrees
Ordinance No.109	:	Recording of a change of name of a University Student in the records of the University
Ordinance No.138	:	For improvement of Division
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Registrar
Sant Gadge Baba Amravati University

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION

No. : 16/2010   Date : 11/06/2010

Subject   :   **Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course-Semester Pattern), Direciton, 2010.**

Whereas, University Grants Commission, New Delhi vide D.O.No.F-2/2008/(XI Plan), Dtd.31 Jan.2008 regarding new initiatives under the 11th Plan – Academic Reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reform at the earliest.

AND

Whereas, the Academic Council while considering the above letter in its meeting held on 30.4.2008, vide item No.55 has resolved to refer the same to Dean's Committee, and the Dean's Committee in its meeting held on 19.07.2008 has decided to refer the matter to all Board of Studies.

AND

Whereas the recommendations of various Board of Studies in the faculty of Science regarding Upgradation and Revision of various syllabi and introduction and implementation of Semester Pattern Examination System at under graduate level was considered by the faculty of Science in its meeting held on 7.12.2009 and constituted a Committee of all Chairmen of Board of Studies and one member nominated by Chairmen of respective B.O.S. under the Chairmanship of Dean of faculty to decide the policy decision regarding semester pattern examination system.

AND

Whereas, the faculty of Science in its emergent meeting held on 11th May, 2010 vide item No.26, has considered, accepted and recommended to Academic Council, the policy decision regarding introduction of Semester pattern and the draft syllabi of B.Sc. Part-I (Semester-

I & II) along with draft ordinance and other details. The recommendations of the faculty was approved by the Academic Council in its emergent meeting held on 28.5.2010, vide item No.35 D).

AND

Whereas, Ordinance No.143 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) is in existence in the   University as per annual pattern examination system.

AND

Whereas, new scheme of examination as per semester pattern is to be implemented from the Academic Session 2010-11 for Semester-I & onwards which is regulated by an Ordinance and framing of an Ordinance for the above examination is likely to take some time.

AND

Whereas, the admission of students in the semester pattern at B.Sc. Part-I (Semester-I) are to be made in the Academic Session 2010-11.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1.   This Direction may be called, "Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course-Semester Pattern), Direciton, 2010".

2.   This direction shall come into force with effect from the date of its issuance.

3.   (i)   The following shall be the examination leading to the Degree of विज्ञान स्नातक (Bachelor of Science) in the faculty of Science-

        (1)   The विज्ञान स्नातक भाग-१, सत्र-१ व २
               (B.Sc. Part-I, Sem-I & II) Examination;
        (2)   The विज्ञान स्नातक भाग-२, सत्र-३
               (B.Sc. Part-II, Semester-III) Examination;
        (3)   The विज्ञान स्नातक भाग-२, सत्र-४
               (B.Sc. Part-II, Semester-IV) Examination;
        (4)   The विज्ञान स्नातक अन्त्य, सत्र-५
               (B.Sc. Final, Semester-V) Examination; and

(5) The विज्ञान स्नातक अन्त्य, सत्र-६
(B.Sc. Final, Semester-VI) Examination.

(ii) The period of Academic Session shall be such as may be notified by the University.

4. (i) The theory examination of Semester-I & II shall be simultaneously conducted by the University at the end of Semes winter-II in Summer.

(ii) The examination of Semester-III, IV, V & VI shall be conducted by the University and shall held by the end of each semester separately.

(iii) The main examination of Semester-III & V and that of Semester-IV & VI shall be held in Winter and Summer respectively.

(iv) The supplementary examination for Semester-I & II shall be held in Winter and that of Semester-III & V and Semester-IV & VI in Summer and Winter respectively.

That means the theory examination of all the Semesters shall be conducted by the University and shall be held as per the schedule.

Sr.No.	Name of the Examination	Main Examination	Supplementary Examination
1	Semester-I & Semester-II	Summer (Simulteneously)	Winter (Simulteneously)
2	Semester-III & Semester-V	Winter	Summer
3	Semester-IV & Semester-VI	Summer	Winter

5. Subject to their compliance with the provisions of this Direction and of other Ordinances in force from time to time, the following persons shall be eligible for admission to the examinations, namely:-

(a) A student of a College who has prosecuted a regular course of study for not less than one academic year prior to that examiantion;

(b) A teacher in a Educational Institution eligible under the provisions of Ordinance No.18, and

(c) A women candidate who has not pursued a regular course of study.

Provided that in the case of the persons eligible under clauses (b) and (c) an applicant to the examination shall have attended a full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. The candidate shall submit a Certificate to that effect signed by the Principal of the college.

6. **(I)** **The Students passing H.S.C. Examiantion with Physics, Chemistry and Mathematics shall offer following subjects at B.Sc. Part-I Examination.**

(i) English and any one of the following languages Marathi, Hindi, Urdu, Sanskrit, and Supplementary English.

(ii) Three optional subjects atleast one subject from the following groups be selected.

Group A :- Chemistry, Industrial Chemistry, Petro-Chemical Science, Electronics, Mathematics.

Group B :- Physics, Geology, Statistics, Computer Science, Computer Application, Information Technology and Geography.

The Students passing H.S.C. Examination with Chemistry and Biology shall offer following subjects:-

(i) English and any one of the following languages. Marathi, Hindi, Urdu, Sanskrit and Supplementary English.

(ii) Chemistry.

(iii) Two optional subejcts form the following group be selected.

Group C : Botany, Zoology, Bio-Chemistry, Geography, Fisheries, Environmental Science, Microbiology, Geology, Food Science, Industrial Microbiology, Biotechnology and Appiculture.

For Vocational subjects sanctioned by U.G.C. there shall be following scheme of Combination of subjects :-

Students with Mathematics at H.S.C. Examination shall select two subjects from Group D and one from Group F.

Students passing with Biology, at H.S.C Examination. Shall select two subjects from Group E and One from Group F.

Group D : Physics, Chemistry, Mathematics, Electronics, Statistics Computer Science, Computer Application, Information Technology and Geology.

Group E : Chemistry, Botany, Zoology, Micro-Biology, Geology, Geography, Environmental Science, Industrial Microbiology and Biochemistry.

Group F : Biological Techniques and Specimen Preparation. Industrial Chemistry, Instrumentation, Computer Application, Seed Technology, Industrial Fish and Fisheries, Computer Maintenance, Biotechnology and other Vocational subjects proposed by U.G.C. from time to time shall be included in Group F.

The students passing HSC examination with Physics, Chemistry, Biology and Mathematics shall have the option of opting Bioinformatics subject with any one subject from Group-G and any one subject from Goup-H.

Group G: Botany, Zoology, Bio-Chemistry, Microbiology, Industrial Microbiology , and Biotechnology.

Group H: Chemistry, Physics, Electronics, Statistics, Geology, Mathematics and Computer Science.

(II) **The students passing H.S.C. examination (M.C.V.C. stream) with technical trades mentioned in column No.2 of the following table shall be eligible for admission to the B.Sc. Part-I course in the optional subjects mentioned in column Nos. 3 of the said table as per the scheme given in Group A to H.**

TABLE

Sr. No.	M.C.V.C. group and trade	Subjects allowed for admission to B.Sc.Part-I (Any three from the following)
1	2	3
1	**Para Medical Group** Medical Laboratory Technician Trade	Botany, Zoology, Computer Application (Vocational), Microbiology, Biochemistry, Biotechnology (Regular/ Vocational), Geology, Geography, Environmental Science, Seed Technology (Vocational), Industrial Fish & Fisheries (Vocational), B.T.S.P. (Vocational), Chemistry, Bioinformatics.
2	**Agricultural Group** Horticulture Trade or Crop Science Trade	Zoology, Chemistry, Computer Application (Vocational), B.T.S.P. (Vocational), Seed Technology(Vocational), Microbiology, Biochemistry, Biotechnology (Regular/ Vocational), Geology, Geography, Environmental Science, Botany, Bioinformatics.
3	**Fisheries Group** Inland Fisheries Trade Fish Processing Technology Trade	Botany, Chemistry, Computer Application (Vocational), B.T.S.P.(Vocational), Industrial Fish & Fisheries (Vocational), Microbiology, Biochemistry, Biotechnology (Regular/Vocational), Geology, Geography, Environmental Science, Zoology, Bioinformatics, Appiculture.
4	**Engineering and Technology Group** Electronics Technology Trade	Physics, Computer Science, Geology, Geography, Statistics, Chemistry, Mathematics, Industrial Chemistry (Regular/Vocational) , Computer Application (Vocational), Electronics, Information Technology.

(III) **In the case of** विज्ञान स्नातक भाग-२ सत्र-३ व ४ **(B.Sc. Part-III & IV) Examination:-**
have passed not less than one academic year previously the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination of the University or an examination recognised as equivalent thereto, and

(IV) **In the case of the** विज्ञान स्नातक अन्त्य, सत्र-५ व ६ **(B.Sc. Final, Sem-V & VI) Examination**:- have passed not less than one academic year previously the विज्ञान स्नातक भाग-२, सत्र-३ व ४ (B.Sc. Part-II, Sem-III & IV) Examination of the University or an examination recognised as equivalent thereto;

7. Subject to his/her compliance with the provisions of this Direction and other Ordinances (pertaining to Examination in General) in force from time to time, the applicant for admission, at the end of the course of study of a particular semester to an examination specified in column (1) of the table below, shall be eligible to appear at it, if,

    (i) he/she satisfied the condition in the table and the provisions thereunder.

    (ii) he/she has prosecuted a regular course of study in a college affiliated to the University.

    (iii) he/she has in the opinion of the Principal shown the satisfactory progress in his/her studies.

TABLE

Name of the Exam to appear	The student should have completed the Session / term satisfactorily	The student should have passed
1	2	3
B.Sc. Part-I (Sem-I & II)	Sem-I & II	Qualifying examination.
B.Sc.-II Semester-III	Semester-I & II	One half of the total head prescribed for Sem-I & Sem-II examination

1	2	3
B.Sc.-II Semester-IV	Semester-III	One half of the total head prescribed for Sem-I & Sem-II examination
B.Sc.-III Semester-V	Semester-III & IV	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination
B.Sc.-III Semester-VI	Semester-V	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination

(**Note :** For Calculating the Heads, the theory and the practical shall be consider as a separate head and on calculation fraction if any shall be ignored.)

8. Without prejudice to the other provisions of Ordinance No. 6 relating to the Examination in General, the provisions of Paragraph 5, 8, 10 and 31 of the said ordinance shall apply to every collegiate candidate.

9. The fee for the examination shall be as prescribed by he University from time to time.

10. Every examinee for the विज्ञान स्नातक भाग-२, सत्र-३ व सत्र-४ (B.Sc.Part-II, Sem-III & Sem-IV), Examination shall be examined in each of the three Science subjects in which he has been examined at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination.

11. Every examinee for the विज्ञान स्नातक अंत्य, सत्र-५ व ६ (B.Sc.Final, Sem-V & VI), Examination shall be examined in each of the three Science subjects in which he has been examined at the विज्ञान स्नातक भाग-२, सत्र-३ व सत्र-४ (B.Sc. Part-II, Sem-III & Sem-IV) Examination.

12. An examinee who is successful at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination, may offer an additional subject mentioned in Para (6) (iii) not offered by him at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination, on his prosecuting a regular course of study for one academic year in that subject. Such an examinee shall not be permitted to take any other examination simultaneously with the examination in the additional subjects. The fee for the additional subject shall be as prescribed by the University from time to time.

13. The Scope of the subjects of all semester opted by the students shall be as indicated in the respective syllabi from time to time. The medium of instruction and examination shall be English except for the courses in Languages.

14. The maximum marks alloted to each subject and paper and the minimum marks which an examinee must obtain in order to pass the examination shall be as per Appendices A, B, C, D, E and F appended to this Ordinance.

15. The practical examination of all semesters shall be conducted annually. That means the practical examination shall be conducted as per following schedule.

Sr.No.	Semester	Examination
1	Semester-I & II	Summer
2	Semester-III & IV	Summer
3	Semester-V & VI	Summer

16. The scheme of awarding internal marks shall be as per **Appendix-G** appended with this Direction.

17. Successful examinees at the विज्ञान स्नातक अन्त्य, सत्र-६ (B.Sc. Final, Sem-VI) Examination who obtain not less than 60% marks in aggregate of Sem-I, II, III, IV, V & VI Examination taken together shall be placed in the First Division, those obtaining less than 60% but not less than 45% in the Second Division, and all other successful examinees in the pass Division.

Explanation :
Division at the विज्ञान स्नातक अन्त्य, सत्र-५ व ६ (B.Sc. Final, Sem-V & Sem-VI) Examination shall be declared on the basis of the marks obtained in the Science Subjects at the Sem-I, II, III, IV, V & VI Examination taken together.

18. There shall be no classification of successful examinees at the Sem-I to Sem-V Examinations.

19. An examinee successful in the minimum period prescribed for the examination, obtaining not less than 75% of the maximum marks prescribed in the subject shall be declared to have passed the examination with Distinction in the subject.

Explanation :
(1) Distinction shall be awarded only in Science Subjects including Mathematics.
(2) Distinciton at the विज्ञान स्नातक अन्त्य (B.Sc. Final) Examination shall be awarded on the basis of the marks obtained at the विज्ञान स्नातक भाग-१, सत्र-१ व २; विज्ञान स्नातक भाग-२, सत्र-३ व ४; व विज्ञान स्नातक अन्त्य, सत्र ५ व ६ (B.Sc. Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV, and B.Sc. Final-Sem-V & VI) Examination taken together.
(3) Distinciton shall not be awarded to an examinee availing of the provision of the exemptions and compartments at any of the examination.

20. Provisions of Ordinance No18/2001 in respect of an Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001 shall apply.

21. (A) The students who have passed B.Sc.Final examination of this University or any other statutory University shall be eligible to seek admission for studying practical of any other optional subjects offered for B.Sc. Degree for simultaneous study of complete three year course for that subject in one year and to appear simultaneously for all parts

of examination leading to the degree of Bachelor of Science (additional) in that subject, subject to the following condition.

An examinee shall have attended full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. An examinee shall submit a certificate to that effect signed by the Principal of the College.

(B) On securing not less than minimum marks prescribed for the subject / subjects shall be issued a certificate of having passed the examination in the additional subject/subjects as the case may be.

(C) The application for admission to the examination under (A) above shall be submitted to the Registrar not less than three months before the date of commencement of the examination."

22. As soon as possible after the examinations the Board of Examination shall publish a list of successful examinees at the B.Sc Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV and B.Sc. Final Sem-V & VI Examinations. Such list at the विज्ञान स्नातक अन्य (B.Sc. Final) Examination shall be arranged in three Divisions. The names of the examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in First or Second Division shall be arranged in Order of Merit as provided in the Examinations in General Ordinance No. 6.

23. No Person shall be admitted to B.Sc Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV and B.Sc. Final Sem-V & VI Examinations, if he has already passed the corresponding or an equivalent examination of any other Statutory University.

24. Successful Examinees at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) and the विज्ञान स्नातक भाग-२, सत्र-३ व ४ (B.Sc. Part-II, Sem-III & IV) Examination shall be entitled to receive a Certificate signed by the Registrar and successful examinee at the end of विज्ञान स्नातक अन्य सत्र-६ (B.Sc. Final, Sem-VI) Examination, shall on payment of the prescribed fees, receive a Degree in the Prescribed form, signed by the Vice-Chancellor.

Appendix-A

Examination Scheme
विज्ञान स्नातक भाग-१
(B.Sc. Part-I) (Semester-I)

| Sr. No. | Subject | Examination Scheme | | | | | | Total |
| | | Theory | | | | Practical | | |
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Compulsory English	40	10	50	18	—	—	50
2	Languages	40	10	50	18	—	—	50
3	Mathematics (Paper-I)	60	15	150	54	—	—	150
4	Mathematics (Paper -II)	60	15			—	—	
5	Science subjects excluding Mathematics	80	20	100	35	50	18	150

Grand Total of Semester-I : 450+100

Appendix-B

विज्ञान स्नातक भाग-१
(B.Sc. Part-I) (Semester-II)

| Sr. No. | Subject | Examination Scheme | | | | | | Total |
| | | Theory | | | | Practical | | |
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Compulsory English	40	10	50	18	—	—	50
2	Languages	40	10	50	18	—	—	50
3	Mathematics (Paper-III)	60	15	150	54	—	—	150
4	Mathematics (Paper -IV)	60	15			—	—	
5	Science subjects excluding Mathematics	80	20	100	35	50	18	150

Grand Total of Semester-I : 450+100

Appendix-C

विज्ञान स्नातक भाग-२. सत्र ३
(B.Sc. Part-II) (Semester-III)

Sr. No.	Subject	Examination Scheme						Total
		Theory				Practical		
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-V)	60	15	150	60	—	—	150
4	Mathematics (Paper-VI)	60	15				—	
5	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-III : 450

Appendix-E

विज्ञान स्नातक अंत्य सत्र ५
(B.Sc. Final) (Semester-V)

Sr. No.	Subject	Examination Scheme						Total
		Theory				Practical		
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-IX)	60	15	150	60	—	—	150
4	Mathematics (Paper-X)	60	15				—	
5	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-V : 450

Appendix-D

विज्ञान स्नातक भाग-२. सत्र ४
(B.Sc. Part-II) (Semester-IV)

Sr. No.	Subject	Examination Scheme						Total
		Theory				Practical		
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-VII)	60	15	150	60	—	—	150
4	Mathematics (Paper-VIII)	60	15				—	
5	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-IV : 450

Appendix-F

विज्ञान स्नातक अंत्य सत्र ६
(B.Sc. Final) (Semester-VI)

Sr. No.	Subject	Examination Scheme						Total
		Theory				Practical		
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-VII)	60	15	150	60	—	—	150
4	Mathematics (Paper-VIII)	60	15				—	
5	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-VI : 450

Note : 1 There shall be only one theory paper of each science subject other than Mathematics for every semester.

2. Distribution of marks of practical within the limit of Max. Marks shall be as prescribed by the B.O.S. of the concerned subject.

3. In absence of certificate for practical record book (Appendix-H), examinee shall not be allowed to appear for the practical examination.

Appendix-G

The internal assessment marks assigned to each theory paper as mentioned in **Appendix-A to F** shall be awarded on the basis of assignment, class test, attendance, project assignments, Seminar, Study tour, Industrial visit, Visit to educational institutions and research organization, field work, group discussion or any other innovative practice/activity. The marking scheme for each of the practice/activity shall be as under :-

Sr. No.	Semester	Practice /Activity	Details of marking scheme	Total marks for		
				Languages	Mathematics	Other Science Subjects
1	2	3	4	5	6	7
1	Semester -I & II	Assignment	Two assignments per theory paper	04	05	08
2	Semester-I & II	Class Test	Two class test (on passing test)	06	10	12
	Total marks for Sem-I /II			10	15	20
3	Sem-III, IV, V & VI	Project Assignment	On latest developments in the subject in 100-200 words	—	03	04
4	Sem-III, IV, V & VI	Class Test	Two class test (on passing test)	—	08	10

1	2	3	4	5	6	7
5	Sem-III, IV, V & VI	Seminar, Study tour, Industrial visit, Visit to educational institutions, research organization, field work, group discussion or any other innovative practice/ activity.	Any one of the activity with report of the activity.	—	04	06
	Total marks of Sem-III/ IV/V/ VI			—	15	20

Note : 1. The concerned teacher shall have to keep the record of all the above activities till the passing out of that batch.

2. At the beginning of each semester, every teacher shall inform his/her students unambiguously the method he/she proposes to adopt a scheme of marking for the internal assessment.

3. Teacher shall announce the schedule of activity for Internal Assessment in advance in consultation with HOD/ Principal.

4. Normally the teacher concerned may conduct three written tests spread periodically during the semester and award the marks on the test on passing of any two tests.

5. The internal marks shall be displayed on the notice board before three weeks of the commencement of the theory examination. Grievances if any, of the student regarding Internal Assessment marks shall be settled by the Principal at college level in consultation with the concerned teacher.

6. Final submission of internal marks to the University shall be before commencement of the theory examinations.

Appendix-H

CERTIFICATE

Name of College / Institution : ....…………………………………….

....

Name of the Department :-………………………………………………

....

      This is to certify that this Book contains the bonafide record of the practical work of Shri/Kumari/Shrimati

…·…

…………………………………………………………………………

of B.Sc.Part-……….. (Semester-…….) during the Academic year

…·…·…·…·…·…·…·…·…·…·…·…·…

Dated :……/…..../20…..

Signature of the Teacher
who taught the examinee

1. …·…·…·…·…·…·…·…

2. …·…·…·…·…·…·…·…

                             Head of the Department

(**Note :**   In absence of certificate for practical record book (Appendix-H), examinee shall not be allowed to appear for the practical examination.)

                           Sd/-

Amravati   (Dr.Kamal Singh)

Date : 11/6/2010   Vice-Chancellor

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Sang Gadge Baba Amravati University, Amravati

DIRECTION

No. : 37 / 2011   Date : 26.7.2011

Subject : Corrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern)

      Whereas, the Direction No. 16 of 2010 regarding Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern), Direction-2010 is in existence.

                AND

      Whereas, the existing provision regarding theory examination of Semester-I & II shall be simultaneously conducted by the University at the end of Semester-II in Summer as well as the practical examinations shall be conducted annually for each semester.

                AND

      Whereas, the Committee constituted by the faculty of Science, under the Chairmanship of Dean of the faculty in its meeting held on 28.6.2011 and 14.7.2011 has considered the issues regarding conduction of theory and practical examination of B.Sc. Semester-I to VI at the end of each semester, from the Academic Session 2011-12.

                AND

      Whereas, making amendments in the Ordinance for above examination is a time consuming process.

                AND

      Whereas, it is necessary to carryout the corrections to Direction No.16 of 2010 issued earlier as stated in para No.1 above, urgently.

      Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1.   This Direction may be called "Corrigendum to Direction No.16/ 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern)".

2. This direction shall come into force from the date of its issuance.
3. From the Academic Session 2011-12, theory and practical examinations of each Semester shall be conducted separately at the end of each semester.

Sd/-
Amravati (Dr.Mohan K.Khedkar)
Date : 26/7/2011 Vice-Chancellor

*****

DIRECTION

No. : 1 / 2012 Date :23.1.2012

Subject : Corrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern)

Whereas, the Direction No.16 of 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern) in the faculty of Science is in existence.

AND

Whereas, corrigendum to Direction No.16 of 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern) was issued vide Direction No.37/ 2011 on dated 26.7.2011.

AND

Whereas, the Academic Council in its meeting held on 13.1.2012 vide item Nos.14 (5) (E) and 14 (5) (O) respectively has accepted to allow the students passing H.S.S.C. examination (M.C.V.C. stream) with Medical Laboratory Technician Trade for admission to B.Sc. Part-I under the group-"Chemistry, Environmental Science, Industrial Microbiology,", and the recommendations of the Monitoring Committee under the Chairmanship of Dean, faculty of Science of its meeting dated 15.11.2011 regarding correction in marking scheme of Internal Assessment Marks at B.Sc. level.

AND

Whereas, as per decision of Academic Council, the above correction are to be carried out in Column No.3 against Sr.No. 1 under the table of sub-clause (II) of Para 6 and in Appendix-G of Direction No.16 of 2010 issued earlier for the Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern) in the faculty of Science for Summer-2012 examinations and onwards.

AND

Whereas, it is necessary to carry out the corrections in the above said Direction immediately.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called "Corrigendum to Direction No.16/ 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern) in the faculty of Science".
2. This direction shall come into force from the date of its issuance.
3. In Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course – Semester Pattern) in the faculty of Science-

A) the words "Industrial Microbiology" after the word "Bioinformatics" in column No.3 against Sr.No.1 under the table of Sub-clause (II) of para 6 of Direction No.16 of 2010 shall be added.

B) in Appendix-G following corrections be carried out :
   1. In column No.4, at Sr.No.1, the words "Two assignments" be replaced by the words "One assignment".
   2. In column No.4, at Sr.No.2, the words & signs "Two Class Tests (On passing test)" be replaced by the words "One test".
   3. In column No.4, at Sr.No.4, the words & signs "Two Class Tests (On passing test)" be replaced by the words "One test".
   4. In column No.4, at Sr.No.5, the words "Any one of the activity" be replaced by the words "Any one of the activities".

5. The Note No.4 be deleted and substituted by the following para.
"The test with maximum 30 marks be conducted for the students and the marks be allotted based on the performance of the students as under-"

	Languages	Mathematics		Other Sci. subjects	
	Sem-I & II	Sem-I & II	Sem-III to VI	Sem-I & II	Sem-III to VI
For the score 24 and above.	06	10	08	12	10
From 18 to 23	05	08	06	10	07
From 11 to 17	04	06	04	07	05
From 0 to 10	00	00	00	00	00

6. The following Note be added at Sr.No.7 -
"The student who remain absent for internal assessment through out the semester, 'Zero' marks be given to him/her while posting the marks instead of writing "Ab" before his/her name."

Sd/-
Amravati   (Mohan K.Khedkar)
Date : 23/1/2012   Vice-Chancellor

*****

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

The Executive Council, dat4ed 1/2-4 -1977, 11-7-1977 has prescribed the Teaching periods in the various subject in the Faculty of Science as follows.

Examination: **B. Sc. Part - I**

	Subject	**Theory**	**Practical**
1.	Chemistry	6	6
2.	Physics	6 + 1 Tutorial	6
3.	Botany	6	6
4.	Zoology	6	6
5.	Geology	6	6
6.	Mathematics	9 +1 Tutorial-	-
7.	Statistics	6	6
8.	English		
	Languages:	4 + 1 Tutorial-	-
9.	Supplementary English	3	
10.	Marathi	3	
11.	Hindi	3	
12.	Sanskrit	3	
13.	Biochemistry	6	6
14.	Microbiology	6	6
15.	Electronics	6	6
16.	Computer Science	6	6

B.Sc. Part - II and B.Sc. Final

1.	Physics	6 + 2	6
2.	Mathematics	9 + 1 Tutorial-	-
3.	Chemistry	6	6
4.	Botany	6	6
5.	Zoology	6	6
6.	Geology	6	6
7.	Statistics	6	6
8.	biochemistry	6	6
9.	Microbiology	6	6
10.	Electronics	6	6
11.	Computer Science	6	6

NOTIFICATION

No. 62/2019   Date : 4 July, 2019

Subject :   **Implementation of New Syllabi of Various Course/Subjects as per semester and credit & Grade System in the Faculty of Commerce Management from the session 2019-2020 & onwards.**

It is notified for general information of all concerned that, the authorities of the University has accepted Semester & Credit & Grade System syllabi of various Course/ Subjects of **B.Com. Part-III, Semester- V & VI** mentioned in column No.2 and which is to be implemented stagewise from the session 2019-2020 and onwards with appendices as shown in column No.3 of the following table.

TABLE

Sr.No.	Course / Subjects	Appendices of the new syllabi.
1	2	3

B.Com. Semester- V

1.	**Compulsory English**	The Syllabi prescribed for the subject Compulsory English which is appended herewith as **Appendix - A**
2.	**Suppllementary English**	The Syllabi prescribed for the subject Suppllementary English which is appended herewith as **Appendix - B**
3.	**Marathi**	The Syllabi prescribed for the subject **Marathi** which is appended herewith as **Appendix - C**
4.	**Hindi**	The Syllabi prescribed for the subject **Hindi** which is appended herewith as **Appendix - D**
5.	**Sanskrit**	The Syllabi prescribed for the subject **Sanskrit** which is appended herewith as **Appendix - E**
6.	**Pali & Prakrit**	The Syllabi prescribed for the subject **Pali & Prakrit** which is appended herewith as **Appendix - F**
7.	**Urdu**	The Syllabi prescribed for the subject **Urdu** which is appended herewith as **Appendix - G**
8.	**Cost Accounting**	The Syllabi prescribed for the subject **Cost Accounting** which is appended herewith as **Appendix - H**
9.	**Business Environment**	The Syllabi prescribed for the subject **Business Environment** which is appended herewith as **Appendix – I**
10.	**Business Regulatory Frame Work**	The Syllabi prescribed for the subject **Business Regulatory Frame Work** which is appended herewith as **Appendix - J**
11.	**Process Business - I**	The Syllabi prescribed for the subject **Process Business - I** which is appended herewith as **Appendix - K**
12.	**Co-Operative Business - I**	The Syllabi prescribed for the subject **Co-Operative Business - I** which is appended herewith as **Appendix - L**
13.	**Indian Insurance System - I**	The Syllabi prescribed for the subject **Indian Insurance System - I** which is appended herewith as **Appendix - M**
14.	**Indian Banking System- I**	The Syllabi prescribed for the subject **Indian Banking System- I** which is appended herewith as **Appendix - N**
15.	**Internet & www -I**	The Syllabi prescribed for the subject **Internet & www -I** which is appended herewith as **Appendix - O**
16.	**e-Commerce - I**	The Syllabi prescribed for the subject **e-Commerce - I** which is appended herewith as **Appendix - P**

B.Com. Semester- VI

17.	**Compulsory English**	The Syllabi prescribed for the subject **Compulsory English** which is appended herewith as **Appendix -**
18.	**Suppllementary English**	The Syllabi prescribed for the subject **Suppllementary English** which is appended herewith as **Appendix - R**
19.	**Marathi**	The Syllabi prescribed for the subject **Marathi** The Syllabi prescribed for the subject Hindi which is which is appended herewith as **Appendix - S**
20.	**Hindi**	The Syllabi prescribed for the subject **Hindi** which is appended herewith as **Appendix - T**
21.	**Sanskrit**	The Syllabi prescribed for the subject **Sanskrit** which is appended herewith as **Appendix - U**
22	**Pali & Prakrit**	The Syllabi prescribed for the subject **Pali & Prakrit** which is appended herewith as **Appendix - V**
23.	**Urdu**	The Syllabi prescribed for the subject **Urdu** which is appended herewith as **Appendix - W**
24.	**Management Accounting**	The Syllabi prescribed for the subject **Management Accounting** which is appended herewith as **Appendix -**
25.	**Economics of Development**	The Syllabi prescribed for the subject **Economics of Development** which is appended herewith as **Appendix -Y**
26.	**Company Law**	The Syllabi prescribed for the subject **Company Law** which is appended herewith as **Appendix -Z**
27.	**Process Business - II**	The Syllabi prescribed for the subject **Process Business - II** which is appended herewith as **Appendix - AA**
28.	**Co-Operative Business - II**	The Syllabi prescribed for the subject **Co-Operative Business -II** which is appended herewith a **Appendix - AB**
29.	**Indian Insurance System - II**	The Syllabi prescribed for the subject **Indian Insurance System - II** which is appended herewith as **Appendix -AC**
30.	**Indian Banking System- II**	The Syllabi prescribed for the subject **Indian Banking System- II** which is appended herewith as **Appendix -AD**
31.	**Internet & www -II**	The Syllabi prescribed for the subject **Internet & www-II** which is appended herewith as **Appendix - AE**
32.	**e-Commerce - II**	The Syllabi prescribed for the subject **e-Commerce - II** which is appended herewith as **Appendix - AF**

Sd/-
Registrar
Sant Gadge Baba Amravati University
Amravati.

Appendix - A

B.Com. III
Semester- V
Compulsory English

Time: 2 Hours   *Marks: 40*

Prescribed Textbook : Horizons by Board of Editors Published by Orient Blackswan.

CONTENTS

UNIT I : PROSE		
SR.NO	PROSE	AUTHOR
1	Ratan Tata	
2	Steve Jobs	
3	Vijay Bhatkar	
4	Black Money and the Black Economy	C. Rammanohar Reddy
UNIT II : POETRY		
1	A Red, Red Rose	Robert Burns
2	It is needless to ask the saint the caste to which he belongs	Kabir
3	Love's Philosophy	P.B. Shelly
4	The Garden	Andrew Marvell
UNIT III : BUSINESS COMMUNICATION		

Computer Technology & Recent Concepts in Business
- ✓ Paperless office
- ✓ Video Conferencing
- ✓ E-Banking

Communication Skills
- ✓ Public Speaking (Strategies for Effective Speaking, Types of Speeches)

MARKING SCHEME

UNIT I: Prose : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT II : Poetry : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT III : Business Communication :

Any TWO out of THREE Questions (2 x 4 = 8 Marks)

8 Multiple Choice Questions on Unit I & II (8 x 1 = 8 Marks)

INTERNAL ASSESSMENT :

Seminar Skill : 5 Marks

Home Assignment : 5 Marks

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Appendix - B

B.Com. III
Semester- V
Supplementary English

Time: 2 Hours   *Marks: 40*

Prescribed Textbook : Golden Harvest An English Coursebook for Undergraduates   by Board of Editors Published by Orient Blackswan.

CONTENTS

UNIT I : PROSE		
SR.NO	**PROSE**	**AUTHOR**
1	A Real Good Smile	Bill Naughton
2.	What India Inc wants a.Our muddled generation : b.Employers look for potential employees, not exam results	Dinesh Kumar Manish Sabharwal
3	A Simple Philosophy	Seathl
4	Mother Teresa	R.G.Herod
UNIT II : POETRY		
1	My mind to Me a Kingdom Is	Edward Dyer
2	Drama for a Winter Night	Langston Hughes
3	Youssuf	James Russell Lowell
4	Flowers are Red	Harry Chopin
UNIT III : One Act Play		
Death Trap : Saki		

MARKING SCHEME

UNIT I: Prose : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT II : Poetry : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT III : One Act Play

Any TWO out of THREE Questions (2 x 4 = 8 Marks)

8 Multiple Choice Questions on Unit I & II (8 x 1 = 8 Marks)

INTERNAL ASSESSMENT :

Seminar Skill : 5 Marks

Home Assignment : 5 Marks

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Appendix - C

बी.कॉम.भाग-३
विषय :- मराठी
सत्र पाचवे

लेखी परीक्षा -४० गुण
अंतर्गत मूल्यामापन – १० गुण

नेमलेले पाठ पुस्तक ''आशय'' भाग-३

अनुक्रमणिका

विभाग अ : वैचारिक

१) राजष शाहू महाराज यांचे शिक्षण विषयक कार्य – गो वद पानसरे

२) आगरकरांच्या राजकीय विचारांची प भूमी – डॉ.अशोक चौसाळकर

३) पाणी आणि पर्यावरणनिष्ठ जागतिकीकरण – दिलीप पु. चित्रे

विभाग ब : ललित

१) वटवृक्ष उन्मळून पडतोय – प्रा.अविनाश डोळस

२) अनुभवातून शिकलेलं शहाणपण – धनंजय दातार

३) सुखदु:खाचा ताळेबंद - आशुतोष शेवाळकर

४) अधारयात्रा - सतीश तराळ

विभाग क : कविता

१) सत्याच्या जातीला - शरच्चं मु तबोध

२) मा ी कविता – नागराज मंजुळे

३) माती -   शोभा रोकडे

४) दोन मुतुकं - संजय घरडे

५) पा स आला – विजय सोसे

विभाग ड : उपयोजित मराठी

१) निविदासूचना लेखक –

२) इतिवृ । लेखन –

==

बी.कॉम.भाग-३
विषय :- मराठी
सत्र पाचवे

वेळ – २ तास

एकूण गुण - ५० गुण
लेखी परीक्षा -४० गुण
अंतर्गत मूल्यामापन – १० गुण

नेमलेले पुठ पुस्तक : ''आशय'' भाग-३ (सत्र-५ व सत्र-६)
लेखी परीक्षा गुण विभागणी :
विभाग अ : वैचारिक   ०८ गुण
विभाग ब : ललित   ०८ गुण
विभाग क : कविता   ०८ गुण
विभाग ड : उपयोजित मराठी   ०८ गुण
वरिल सर्व विभागांवर आधारित वस्तुनिष्ठ बहुपर्यायी प्रश्न   ०८ गुण
एकूण   ४० गुण

विभाग ''ड'' साठी संदर्भ म्हणून ''उपयोजित मराठी '', ''निविदासूचना लेखन'' ''इतिवृ ा लेखन'' हे दोन प्रकरण नेमण्यात आले असून त्यावर आधारित दोन लघु ारी प्रश्न विचारण्यात येतील. चार गुणांचा एक प्रश्न प्रत्यक्ष प्रकरणावर आधारित असेल आणि चार गुणांचा दुसरा लघु ारी प्रश्न हा निविदासूचना तयार करणे कवा इतिवृ ा तयार करणे अशा स्वरुपाचा असेल.

प्रश्ननिहाय गुण विभागणी

प्रश्न – १ ला (विभाग अ : वैचारिक) १ दीघो ारी प्रश्न   ०८ गुण

प्रश्न – २ रा (विभाग ब : ललित) १ दीघो ारी प्रश्न   ०८ गुण

प्रश्न – ३ रा (विभाग क : कविता) २ लघु ारी प्रश्न (प्रत्येकी ४ गुण)   ०८ गुण

प्रश्न – ४ था (विभाग ड : उपयोजित मराठी) २ लघु ारी प्रश्न (प्रत्येकी ४ गुण)   ०८ गुण

       (टिप - वरील सर्व प्रश्नांना अंतर्गत पर्याय राहील.)

प्रश्न – ५ वा (विभाग अ,ब,क,ड) ८ वस्तुनिष्ठ प्रश्न (प्रत्येकी १ गुण)   ०८ गुण

          (टिप - अभ्यासक्रमातील अ,ब,क, ड या विभागांवर आधारीत प्रत्येकी २ प्रश्न)

अंतर्गत मूल्यामापन

एकूण १० गुणांची अंतर्गत मूल्यमपान परीक्षा राहील.

 गुण विभागणी

   १) घटक चाचणी (Class Test)   ०५ गुण
   २) गृहपाठ (स्वाध्याय) (Home Assignment)   ०५ गुण

लेखी परिक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उ ाीर्ण होणे आवश्यक असेल. त्यासाठी किमान गुण खालील प्रमाणे आवश्यक असतील.

लेखी परीक्षा   -   ४० पैकी १६ गुण आवश्यक

अंतर्गत मूल्यमापन   -   १० पेकी ४ गुण आवश्यक

सूचना :-

   १) घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळा चाचणी घेवून अंतिम परीक्षेत सरासरी गुणदान ा धरण्यात यावे.
   २) गृहपाठ हा पाठ पुस्तकांव्यतिरि त इतर कोणत्याही भाषिक कौशल्य विकसित करणा-या विषयावर असावा.

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Appendix - D

बी. कॉम. तृतीय वर्ष
सत्र - पंचम
हिन्दी

समय - २ घण्टे   पूर्णांक - ४०

पाठ्यक्रम का इकाइयों में अंक विभाजन एवम् प्रश्नों का स्वरूप निम्न प्रकार से होगा।

इकाई : एक   -   आधारभूत पाठ्यक्रम के तीन निबंध (१ से ३) से एक दीघा री प्रश्न विकल्प के
साथ पू ा जायेगा।   १ X ८ = ८ अंक

इकाई : दो   -   भाषागत पाठ्यक्रम के पाँच पाठ (१ से ५) से कुल पाँच लघू री प्रश्न पू `
जायेंगे। जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।   ३ X ४ = १२ अंक

इकाई : तीन   -   प   विभाग से   : कविता (१ से ६) से दो कविताओं का केन ीय भाव विकल्प
के साथ पू ा जायेगा ।   २ X ४ = ८ अंक

इकाई : चार   -   उत्पादित वस्तु के विक्री हेतू एक वि ापन का प्रारुप विकल्प के साथ पू ा
जायेगा।   ४ X १ = ४ अंक

इकाई : पाँच -   इकाई एक, दो और तीन से कुल आठ वस्तुनिष्ठ अतिलघू री प्रश्न पू ` जायेंगे।
                                       ८ X १ = ८ अंक

              आन्तरिक मूल्यांकन   १० अंक

१.   पाठ्यपुस्तक पर आधारित गृहपाठ   -   ५ अंक
२.   पाठ्यपुस्तक पर आधारित मौखिकी   -   ५ अंक

पुस्तक - प्रभास, संपादक - डॉ.निभा उपाध्याय, डॉ. सुशांत ठोके, ॉ.मनोज जोशी
         प्रकाशक - राघव प ब्लशर्स एण्ड डि स्टब्युटर्स, नागपुर.

Appendix - E
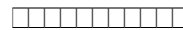
वाणिज्य स्नातक B.Com भाग ३ (सत्र - ५)
संस्कृत आवश्यक

पुस्तक   : गीर्वाणसारथिः - भाग ३
मुख्य संपादक - डॉ. भगवान पंडा,
सह संपादक   - डॉ. मीना ी भांदककर, ी आतिश कुलकण

       गुण - लेखी परीक्षा   - ४०   वेळ – २ तास
            अन्तर्गत मूल्यमापन   - १०
            एकूण गुण   - ५०

घटक – १ : ग   पाठ १ व २   - ०८ गुण

घटक – २ : ग   पाठ ३ व ४   - ०८ गुण

घटक – ३ : प   पाठ १ व २   - ०८ गुण

घटक – ४ : प   पाठ ३ व ४   - ०८ गुण

घटक – ५ : वरील ४ घटकांवर आधारीत प्रश्नावली (भाग ५) - ०८ गुण

-o-

प्रश्नपत्रिकेचे स्वरूप

वेळ - २ तास   पूर्ण गुण - ४०

लेखी परीक्षा

प्रश्न (१) दीघा री प्रश्न (दोन पैकी एक)   - ०८ गुण

प्रश्न (२) ४ पैकी २ अनुवाद करा (५ ते ६ ओळ चे उतारे)   - ०८ गुण

प्रश्न (३) दीघा री प्रश्न (दोन पैकी एक)   - ०८ गुण

प्रश्न (४) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)   - ०८ गुण

प्रश्न (५) १० पैकी ०८ वस्तुनिष्ठ प्रश्न   - ०८ गुण

अन्तर्गत मूल्यमापन -   पूर्ण गुण - १०

१) स्वाध्याय   - ०५ गुण

२) मौखिक   - ०५ गुण

एकूण गुण   --१०

टीप - लेखी परी व अंतर्गत मूल्यमापन या दोन्ही परीं मध्ये स्वतंत्र पणे उत्तीर्ण होणे आवश्यक असेल. यासाठी किमान गुण खालील प्रमाणे आवश्यक असतील.

लेखी परी   - ४० पैकी १६ गुण आवश्यक
अंतर्गत मूल्यमापन - १० पैकी ०४ गुण आवश्यक

गीर्वाणसारथिः (भाग - **३**)

संस्कृत आवश्यक या विषयासाठी प्रस्तावित अभ्यासक्रम

अनुक्रमणिका

पाचवेस

ग विभाग

प विभाग

१) लोकस हिः   - गांधीगीता   एस. एन. ताडप कर

२) अ यो यः   - भामिनीविलासः   पंडित जग िथः

३) भारवेरथगौरवम्   - किराताजुनीयम्   महाकविः भारविः

४) य   ीः   - महाभारतम्   आ दकविः सः

 ावली भाग ५

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                                                         Appendix - F

वाणिज्य स्नातक भाग-३
सेमिस्टर- ५
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास   लेखी परीक्षा-- ४०
                                                   अंतर्गत मूल्यमापन -१०
                                                   एकूण-- ५०

युनिट-१
१)   मशपरिनिब्बाण सु ।   --   १) राजग ‌   ०८ गुण
                              २) अम्बलि कायं
                              ३) अम्बपालिगणिकाय भोजनं

युनिट-२
      धम्मपद   --   १) तव्हावग्गो   ०८ गुण
      चरियापिटक   --   २) निमिराजचरिय

युनिट-३
      थेरीगाथा   --   १) अनोपमा थेरी   ०८ गुण
                              २) सुजाता थेरी

युनिट-४
      बौध्द लेणी   --   १) अंजिठा लेणी   ०८ गुण
                              २) वेरुळ लेणी
                              ३) औरंगाबाद लेणी

युनिट-५
      युनिट क्रमांक १ ते ४ वरील वस्तुनिष्ठ प्रश्न सोडवा   --   ०८ गुण
अंतर्गत मुल्यमापन
      १) घटक चाचणी   --   ०५ गुण   (Class Test)
      २) स्वाध्याय   --   ०५ गुण   (Home Assignment)

सूचना :-
१) घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळ चाचणी घे न
अंतिम परीक्षेत सरासरी गुणदान ॥ धरण्यात यावे.
२) गृहपाठ (स्वाध्याय) हा अभ्यासक्रमावरील असेल.

वाणिज्य स्नातक भाग-३
सेमिस्टर- ५
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास   लेखी परीक्षा-- ४०
                    प्रश्नपत्रिकेचे स्वरुप

प्रश्न - १   अ) भाषांतर करा (दोन पैकी एक)   --   ४ गुण
              ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)   --   ४ गुण

प्रश्न - २ अ) संदर्भासह गाथांचे स्पष्टीकरण (दोन पैकी एक) -- ४ गुण

ब) सामान्य प्रश्न सोडवा (दोन पैकी एक) -- ४ गुण

प्रश्न - ३ दिघा री प्रश्न सोडवा (दोन पैकी एक) -- ८ गुण

प्रश्न - ४ सामान्य माहिती लिहा -- ८ गुण

प्रश्न - ५ वस्तुनिष्ठ प्रश्न सोडवा (प्रत्येकी दोन गुण) -- ८ गुण

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Appendix - G

Urdu Compulsory

B.Com. III

Semester- V

Theory: 40 Marks   Time: 2 Hours

Text prescribed for study: **ROOH-E-ADAB (Part III)**

(As per Model curriculum of the UGC for B.Com III Semester V and published by the Aadhaar Publication Amravati.)

Unit-I : PROSE

1. Aurat (عورت)   Maulana Niyaz Fatahpuri (مولانا نیاز فتح پوری)

Unit-II : PROSE

1. Ek wasiyat ki Tameel (ایک وصیت کی تعمیل)   Mirza Farhatullah Baig (مرزا فرحت اللہ بیگ)

2. Chand Roz America mein (چند روز امریکہ میں)   Ehtesham Husain (احتشام حسین)

Unit-III : Poetry (نظم)

1. Akal aur Nafas ki Guftagoo (عقل اور نفس کی گفتگو)   Altaf Husain Hali (الطاف حسین حالی)

Unit-IV : COMMUNICATION SKILL (ترسیلی مہارت)

1. Letter Writing

Applications for job Complaints Orders etc.

Unit-V : MCQs

Based on Unit. I, II and III

Distribution of Marks (40 : 10)

A : Theory - 40 Marks

Question No. 1 Prose

      Any two long answer questions to be attempted out of four each carrying four marks based on

" Aurat (عورت)"   Marks: 4X2= 08

Question No. 2 Prose

      a)   Any two short answer questions to be attempted out of four each carrying two marks based on

"Ek wasiyat ki Tameel (ایک وصیت کی تعمیل)"   Marks: 2X2= 04

      b)   Any two short answer questions to be attempted out of four each carrying two marks based on

" Chand Roz America mein (چند روز امریکہ میں) "   Marks: 2X2= 04

Question No. 3 Poetry

      Any two stanzas to be attempted out of three each carrying two marks based on poem

"Akal aur Nafas ki Guftagoo (عقل اور نفس کی گفتگو) "   Marks: 4X2= 08

Question No. 4 COMMUNICATION SKILL

   1. Letter Writing

   Applications for job Complaints Orders etc.

   (Any two out of four)   Marks: 4X2= 08

Question No. 5

Multiple Choice Questions based on Unit.I,II and III   Marks: 8X1= 08

B. Internal Assessment -   **10 Marks**

    1. Viva-voce   05 Marks

    2. Assignment   05 Marks

Appendix - H

B.Com. III
Semester- V
Cost Accounting

Time : 3 Hours   *Marks: 80*

Objectives:
1. *This course exposes the students to the basic concepts and tools used in Cost Accounting.*
2. *To provide an understanding of the applications of Cost Accounting techniques for determination of cost of production.*

Unit I: 1.1: Cost Accounting: Meaning; Features; Functions; Advantages; Limitations; Difference between Cost Accounting and Financial Accounting.

1.2: Basic Cost Concepts: Concept of Cost; Cost VS Expenses and Losses; Cost Centre; Cost Unit; Cost Object; Methods of Costing.

1.3: Classification of Cost: Direct and Indirect Method; Fixed and Variable Costs; Historical and Pre-determined Costs.

Unit II: 2.1: Material Cost: Meaning and Classification of Materials; Material Purchase Procedure; Store Keeping; Stores Record.

2.2: Problems on Cost-Sheet (Cost Statements).

Unit III: 3.1: Labour Cost: Meaning of Direct Labour and Indirect Labour;

3.2: Methods of Time Keeping: Attendance Register (Muster Roll); Token or Disc Method; Time Recording Clocks; Biometric Time Recording Clocks.

3.3: Methods of Wage Payment: Time rate system; Piece Rate System; Incentive Schemes of Halsey and Rowan.

3. : Problems on Tender.

Unit IV: .1: Overheads: Meaning and Definitions of Overheads; Classification of Overheads.

.2: Reconciliation of Cost and Financial Accounts: Meaning; Reasons for Variations ; Different Treatment of Items; Items appearing only in Cost Accounts; Problems on Reconciliation of Cost Accounts with Financial Account.

Unit V: .1: Process Costing: Meaning and Characteristics; Process Costing Procedure; Process Losses and Wastages; Joint and By-products, Methods of Assigning Joint Costs; Accounting for Joint Costs.

.2: Problems on Process Costing (Excluding Problems on Abnormal Gain/Loss and Internal Process Profit).

Books Recommended

1. Arora M.N. : Cost Accounting – Principles & Practice, Vikas, New Delhi.
2. Arora M.N. : Cost and Management Accounting – Theory Problems & Solutions, Himalaya Publishing House, Mumbai.
3. Tulsian P.C. Practical Costing : Vikas, New Delhi.
. Maheshwari S.N. : Advanced Problems and Solutions in Cost Accounting, Sultan Chand, New Delhi.
. M.C. Shukla, T.S. Grewal, M.P. Gupta : Cost Accounting ; Text and Problems; S.Chand & Co. Ltd., New Delhi.
. Jawaharlal : Cost Accounting : Second Edition; Tata Mcgraw- Hill Publishing Co. Ltd., New Delhi.
. SK. Sahajahan Ali. Subir Datta, Ashit Baran Saha: Theory and Practice of Cost Accounting: S.Chand & Company Ltd. Ramnagar, New Delhi 110055.

. W.W.Bigg : Cost Accounts
9. L.N. Gupta : Cost Accounts
10. R.R.Gupta : Cost Accounts
11. M.G. Shukla : Cost Accounts
12. Dr. Pramod Fating : Cost & Management Accounting , Sir Sahitya Kendra, Nagpur
13. Cost Management Accounting: Dr.Pramod Fating, Dr. Milind Gulhane, Dr. Abdui Bari, Dr. Raju Rathi, Dr. Vilas Chopade, Prof. Sanjay Kale: Sir Sahitya Kendra , Nagpur

हिन्दी

१. आई.बी.स सेना , लागत लेखा विधी

२. एम.एम.शु ला, लागत लेखा

३. एम.एल.अ ावाल, परिव्यय लेखांकन

४. गुप्त त्रिवेदी , लागत लेखा

मराठी

१. प्रा.बी.एल. जिभकाटे, परिव्यय आणि व्यवस्थापन लेखाकर्म, वि ा पब्लीशर्स, नागपुर

२. महाजन वाय.आर., परिव्यय आणि प्रबंधकीय लेखांकन, पपळापुरे ऑण्ड कं. प ब्लशर्स, नागपुर

३. ाी किशोर मोहरील , परिव्यय आणि प्रबंधकीय लेखाकर्म, दासगणू प्रकाशन, नागपुर

४. सेठी, धूत , परिव्यय लेखाकन, वि ा प्रकाशन, नागपुर

Appendix - I

B.Com Part
SemesterV
Business Environment

Time :Three Hours   **Marks 0**

Course Outcome:-The contents herein intend to develop the ability to understand and interpret sector wise business environment of India.

Unit 1 Indian Business Environment
1.1 Concept, definition and Importance
1.2 Nature and scope of Business Environment
1.3 Components of Business Environment- Internal and External
1.4Current trends in Business Environment:-Post Demonetization Business Environment

Unit 2 Indian Agricultural Environment
2.1 Role and Characteristics of Agriculture in India
2.2 Agricultural Marketing-APMC-Importance, Functioning and Problems
2.3 Need of credit for Indian Farmers- Structure and Importance of NABARD
2.4Current Trends in Agriculture Environment-Crop Insurance Scheme, Kisan Credit Card, Minimum Support Price

Unit 3Indian Industrial Environment
3.1 Industrialization: Role and Pattern
3.2 Definition and Role of Small Scale, Cottage and Micro Industries
3.3 Industrial Sickness: Concept, Definition, Causes and Remedies
3.4 Current Trends in Industrial Environment: Industrial Policy 2013

Unit   Indian ServiceEnvironment
4.1 Nature, Contribution, Scope and Coverage of Indian Service Sector
4.2 Growth and Present State of IT Services in India
4.3 Tourism And Hospitality Industry: Prospects and Problems
4.4 Current Trends in Service Environment: Right to Disconnect

Unit India and Foreign Trade Environment

5.1 Importance of Foreign Trade for a Developing Economy

5.2 Balance of Trade and Balance of Payment

5.3 Foreign Trade Policy

5.4 Current Trends in Foreign Trade Environment: FDI and FII

Books Recommended:
1) Indian economy-Dutt. R.,K Sundaram, S.Chand, Delhi
2) The International business Environment-Sundram and Black, Printice Hall, New Delhi.
3) Economic Environment of Business, Misra and Puri, HPH, Mumbai

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Appendix - J

B.Com. III
Semester - V
Business Regulatory Frame work

Time :3 Hours   **Marks 0**

Objective: To help the students to understand the concept of business Laws and it's applications in business regulation.

Unit-l : Indian Contract Act,1 2 :-
1.1 Definition and Essentials of Valid Contract.
 1.2 Classification of Contracts.
1.3 Communication, Acceptance and Revocation of Proposal.
1.4 Vide and Voidable Contract. Agreement.
1.5 Contingent and Quasi Contract.
1.6 Performance of Contract.
1.7 Consequences and Remedies of Breach of Contract.

Unit- II Special Contacts:-
2.1 Indemnity & Guarantee**:-** Meaning, Rights, of Indemnity Holder and Indiminator. Essential and Kinds of Guarantee, distinction between Indemnity and Guarantee.
2.2 Bailment and Pledg :- Meaning and Elements; Classification Duties and Rights of Bailor and Bailee, Termination of Bailment. Meaning and Essentials of Pledge, Rights and Duties of Pledgee and Pledger.
2.3 Agency:- Meaning, Essentials. Agent, Rules, Test and Creation of Agency.
2.4. Appointment of Agent, Duties, Rights and Position of Principal and Agent.
2.5 Termination of Agency.

Unit- III Sales of Goods Act, 1930 and Consumer Protection Act, 19 :
3.1 General Principles - Meaning Essentials and formation of Contract of Sale.
3.2 Conditions and Warranties :- Meaning Difference
3.3 Transfer of Ownership - Importance and Rules Regarding transfer of Ownership Duties of Seller and Buyer, Unpaid Seller.
3.4 Definition of Consumer, Importance, Objectives of Consumer Protection Act.
 3.5 Grievance Redressal Mechanism

Unit - IV : Negotiable Instrument Act, 1 1:
4.1 Introduction and Characteristics of Negotiable Instrument
 4.2 Promissory Note, Bill of Exchange, Cheque and Bank Draft and there Definitions Characteristics, Types of endorsements, Crossing of Cheque
4.3 Holder, Holder in due course, Discharge of parties
 4.4 Acceptance, Dishonour and Discharge of Negotiable Instrument

Unit- V: Goods and Services Tax Act, 201 :

5.1 Definition of Goods, Services, CGST, SGST and IGST

5.2 Input Tax Credit, Supply of Goods or Services or Both

 5.3 Rate of GST.

5.4. Basic Procedures in GST.

 5.5 Powers of GST Officer, Offences, Penalties and Appeals.

Reference Books:

1. A Manual of Business law :Dr.S.N. Maheshwari and S.K. Maheshwari, Himalaya Publishing house ,New Delhi

2.Business Like: Tejpal sheth dorling Kindersley (India) Pvt. Ltd.

 3. Mercantile law: MC Shukla S.Chand and company limited, New Delhi

4. Business law P.C. Tulsani Tata Mc-graw Hill Publishing Company limited, New Delhi

5.Business Law: P.Sarvanavel S.Senthil & S.Balakumar, Himalaya publishing house New Delhi

6.Business Law: C.L. Bansal, Taxman 's New Delhi

7. GST Ready Reckoner V.S. Date ,Taxman 's New Delhi

8. Indian Contact Act. & Sales of Goods Act: P. Sarvenavel, S. Sumathi, Himalaya Publishing House, New Delhi.

9. Mercantile Law : N.D. Kapoor, Sultan Chand & Sons Educational Publishing. New Delhi.

10. व्यवसायिक कायदे: प्रकाश देहलवाल, विश पटलिशर एंड डिस्ट्रीब्यूटर, नागपुर

11. व्यवसाय नियामक तत्व प्रमंडल कायदा डॉ. अरविंद शिंदे, होते, जाधव, खडसे व नेउलकर, अनुराधा प्रकाशन, नागपुर

12. व्यवसाय नियामक फायदे रचना आणि कंमनीयांचा कायदा ए एस उखडकर, पिंपलापुरे पटलिशसनागपुर

13. व्यावसायिक नियमन संरचना डॉ चौधरी आणि डॉ. तुषार कोटक : सांई ज्योति पटलिकेशन , नागपूर

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Appendix - K

B.Com.III

Semester- V

Process Business - I

Time: 3 Hours   *Marks: 80*

Objectives :

         The course aims to educate the students with the different factors which effect business. This course aims to develop ability to understand and scan business environment as well as process in order to analyses the opportunities and take decisions under the uncertainty.

UNIT - I

Business Process :- concept, significance and nature, Elements of Business environment internal and external; Different roles of government in relation to business process. Social Responsibilities of Business.

UNIT - II

Industrial Policy - Its historical perspective in brief, Industrial Policy, Liberalisation. Economics Planning in India; Rational of economic planning, year plan - Eleventh five year plan concept & feathers.

UNIT - III

Public sector - its objectives and working, major problems of public sector enterprises; Privatisation of public sector enterprises - the issue involved. Role of Private and Joint Sectors.

UNIT - IV

Compensation Act - Industries Development and Regulation Act : Silent features, Foreign Exchange Regulation Act (FERA).

UNIT - V

Export- Import Policy ; Globalisation and Business Practices, WTO- Objectives and Role in International.

References Books

1. Indian Economy - By Sundrum R.K.
   and Rreudradatta -- S.Chand Publications
2. Envirolmental Economics - Hedge Lao, Mc millan
3. Industrial Law - N.D.Kapoor.

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Appendix - L

B.Com. III
Semester - V
Co-operative Business- I

Time :3 Hours   Marks   0

Objectives :

1. To grasp the historical development of Co-operatives in India
2. To Understand and appreciate theoretical development of the co-operative enterprises in India.
3. To appreciate role and relevance of co-operatives in the present economics environment.
4. To develop understanding and insight in co-operative development.

Unit - I

Cooperative Movement :- Origin, Meaning defination, Concept of Co-operation Principles of Co-operation.

Unit - II

Cooperative Movement in India History & growth of cooperative movement.
Post independence period / Trends in cooperative business in India.

Unit - III

Cooperative Management :- Concept - Goals - Governance Structure - Board - Executive Relationship   Participative Democratic Control - Comparison of Managements of Profit Business and Cooperative (nonprofit) Business.

Unit - IV

Administrative System for Cooperatives :- At Central, State levels - secretary to government for Co-operatives - Registrars of Cooperative societies - Functional Registrars - Their powers and duties administrative set up under the control of RCS.

Unit - V

Issues In Co-operative Management :- Professional Management, De-officialisation - Operational Efficiency - Cooperative Democracy Vs. Efficiency - Key Result Areas - Strategies for sustainable Development of   Cooperatives in India.

References Books:-

1.kamat G.S , New Dimensions of Cooperative Management, Himalaya Pubishing House, New Delhi, 1987.
2. Kapoor D.R. Hand Book of Cooperative Audit, Anmol Publications Pvt.Ltd.,New Delhi, 1998.
3. Krishnaswami O.R. Cooperative Account Keeping, Oxford IBH Co., New Delhi, 1990.
4. Krishnaswami O.R. Democracy in Action, Somaiya Publishing House, New Delhi, 1990.
5. Kulandaiswamy V.,Text Book of Cooperative Managements, Aruda academy,Coimbatore 2002 .
6. Manickavasagam P.A. Treatise on Cooperative Account Keepting, Rainbow Publications Coimbatore, 1989.
7. Nakkiran, S. A.Treatise on Cooperative Management, Rainbow publications, Coimbatore, 2002.
8. Shah, A.K. Professional Management for Cooperatives, Himalaya Publishing House, New Delhi, 1987
9. Sujit Jikidar and Alok K. Pramanik(ed) Accounting and Auditing, Deep & Deep Publications, New Delhi 2001
10. Weeraman P.E. AModal Cooperative Societies Law with the Authors Commentary, New Delhi,ICA 1994
11. Weeraman P.E. The Effect of Cooperative Law on the Autonomy of Cooperatives in South East Asia, New Delhi, ICA 1989.

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Appendix - M

B.Com.III
Semester - V
Indian Insurance System I

Time : Three Hours   **Marks 0**

Course Outcome: To provide an insight into the working of Insurance Industry

Unit I: Hori on of Insurance Industry

1.1 Insurance: Concept and Objectives

1.2 Insurance: Nature, Scope and Role

1.3 Risk Premises: Concept and Kinds

1.4 Risk: Identification, Assessment& Transfer

Unit II: Life Insurance

2.1 Meaning, Definition and Features, Scope and Coverage

2.2 Need and Assessment

2.3 Types of Plans

2.4 Claim settlement Procedure and Problems

Unit III: Insurance for Industry and Business Fire & Marine

3.1 Meaning, Definition and Features, Scope and Coverage

3.2 Need and Assessment

3.3 Types of Plans

3.4 Claim settlement Procedure and Problems

Unit IV: Insurance for Agriculture Crop &Livestock

4.1 Meaning, Definition and Features, Scope and Coverage

4.2 Need and Assessment

4.3 Types of Plans

4.4 Claim settlement Procedure and Problems

Unit V: Health and Accident

5.1 Meaning, Definition and Features, Scope and Coverage

5.2 Need and Assessment

5.3 Types of Plans

5.4 Claim settlement Procedure and Problems

Suggested Reading:

1) Insurance, Dr. C.J.Joshi, PhadakePrakashan, Kolhapur

2) Insurance Principles and Practice, M.N.Mishra, S.Chand& Company, New Delhi

3) Principles and Practices of Insurance, Dr. P.Periasamy, Himalaa Publishing Houses

Appendix - N

B.Com III SEM V
Indian Banking System-I

Time : 3 Hours   Marks: 80**Course**

Outcome: To provide insight into the various types of banks and their role in Indian Economy.

Unit I: Public Sector Banks

1.1 Concept, features and objectives

1.2 Functions and Importance

1.3 Regulatory Provisions under Banking Regulation Act 1949

1.4 Origin and Role of State Bank of India in Indian Economy

Unit II: Private Banks

2.1 Concept, features and objectives

2.2 Functions and Importance

2.3 Regulatory Provisions under Banking Regulation Act 1949

2.4 Origin and Role of ICICI Bank, HDFC Bank and Axis Bank in Indian Economy

Unit III: Cooperative Banks

3.1 Concept, features and objectives

3.2 Functions and Importance

3.3 Regulatory Provisions under Banking Regulation Act 1949

3.4 Role of District Cooperative Bank in Indian Economy

Unit IV: Development Banks

4.1 Concept, features and objectives

4.2 Functions and Importance

4.3 Regulatory Provisions under Banking Regulation Act 1949

4.4 Role of NABARD in Indian Economy

Unit V: Non-Banking Financial Institutions

5.1 Concept, features and objectives

5.2 Functions and Importance

5.3 Regulations and Types

5.4 NBFC V/s Banks

Suggested Readings:

1) S. Natarajan& Dr. R. Parameswaran, Indian Banking, S.Chand
2) Dr. gangadharKayande-Patil, Fundamentals of Banking, ChaitanyaPublicaitons, Nashik
3) Panandikar S.G. and Mithani D.M., Banking in India, Orient Longman
4) Sayers R.S.: Modern Banking, Oxford University Press
5) Shekhar and Shekhar: Banking Theory and Practice, Vikas Publication House, New Delhi
6) Tennan M.L.: Banking Law and Practices in India, Indian Law House , New Delhi
7) Dr. SudhirBodhankar, Dr. MedhaKanetkar, Indian Banking System, Sainath Publication, Nagpur

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Appendix - O

B.Com. III
Semester V
Internet and World Wide Web - I

Time : 3 Hours   **Marks: 0 Theory**

Objective : The course aims at familiarizing the students with the basic concepts and ground rules of Internet and the various services it offers including designing of website and how to access information from depositories in the world wide web.

Unit I:

1.1: Network: Meaning of Network, Types of Network Topologies: Bus Topology, Ring Topology, Star Topology, Mesh Topology, Tree Topology, Hybrid Topology

1.2: Types of Networks: Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN)

1.3 :   Network Model: Peer to Peer Network, Server based Network

Unit II:

2.1 : Internet : Concept, Uses of Internet, essential components for internet

2.2   Internet Enabled Services: Usenet & News group, File Transfer Protocol, Internet Relay Chat, Frequently asked question

2.3 : The mechanism of the internet: Internet protocol suite, protocol stack, TCP/IP protocol model

2.4 : Open System Interconnection Reference Model (OSIRM): Application Layer, Presentation Layer, Transport Layer, Network Layer, Data-link layer and Physical Layer, and Application Layer, mechanism transmitting the message across the network and functions of each layer, processing data at the destination.

Unit III:

3.1: Electronic Mail : Procedure for creating new email ID , singing in to created email ID , sending email, meaning of BCC and CC, procedure to send attachment through email, deleting email.

3.2: Gmail: Uses and features of Gmail, components of Gmail

3.3: Password: meaning of password, how to create strong password, where password is use on internet.

3.4: Captcha : Meaning of Captcha, why and where Captcha is used, how Captcha is created.

Unit IV:

4.1: The World Wide Web Consortium (W3C): Origin and Evaluation , standardizing the web, W3C members, W3C recommendations.

4.2: Architecture of world wide web, exploring the world wide web, procedure of browsing and searching

4.3: Website: Meaning of Website, web page and home page, features of webpage, Meaning of portal, Address-URL, hyperlink

Unit V:

5.1 Designing Website/ Webpage: HTML: Concepts,features, advantages and limitations, versions of HTML Naming scheme for HTML document

5.2: Explanation of Structure of the home page, HTML Basic Tags, Formatting Tags, and Hyperlink tags, Table Tag, Image Tag, Forms Tags,

Note: For practical:1 Mail account opening, mail send & delete, Creation of web-page by using HTML tagsin Note Pad/ Word Pad.2 Practical batch will be 20 students

Books Recommended:

1) AgarwalaKamlesh N. and AgrawalaDeeksha
   Bridge to theonline storeftont:Macmillon India, New Delhi
2) Phillips Lee Anne,
   Practical HTML 4, Prentice Hall New Delhi.
3) MinoliDeniel, Minoli Emma.
   Web Commerce Technology Hand book, Tata MC:Graw Hill, New Delhi.
4) Deitel Harvey M. and Deitel Paul J and Neita T.R. Complete Internet and World Wide Web programming Training courses, Prentice Hall, New Delhi.
5) इंटरनेट आणि वर्ल्ड वाईट वेब (WWW).. Prof. S.M. Kolte, Pimpalapure& Co. Publishers, Nagpur.

6) ,Internet and World Wide Web, Prof. UdayShrikrushna Kale, Shri SainathPrakashan, DharmpethNagpur-10

Scheme of Examination

Year	Paper	Total Marks		Minimum Passing Marks	
		T	P	T	P
B.Com.	Internet and				
Semester V	World Wide Web- I	0	0	2	1

Division of Marks for Practical

Record Preparations	:	10 Marks
Practical	:	15 Marks
Description	:	10 Marks
Viva	:	5 Marks
Total	:	**0 Marks**

Appendix - P

B.Com. III
Semester V
e–COMMERCE - I

Time : 3 Hours   Marks: 0

Objective: The objective of the course is to familiarize the students with the essentials of internet based e-commerce and to make them comprehend its practical aspects as well as growth potential of e-commerce in India.

Unit I: Basics of e-commerce:

Meaning of e-commerce, Essential components of e-commerce, four basic models/ concepts of e-commerce, Operational scheme of e-commerce, Benefits of e-commerce, Limitations of e-commerce and e-commerce v/s traditional commerce

Unit II: e-commerce in India:

History of Internet, Initiation of internet in India, Growth of internet users in India, Current scenario of e-commerce in India, Government FDI policy about e-commerce in India, Future of e-commerce in India

Unit III: Retail e-commerce:

Concepts of Business to Consumer (B2C), Consumer to Business (C2B) and Consumer to Consumer (C2C) e-commerce, Consumer's shopping procedure on internet, Disintermediation and re-intermediation in B2C, E-auction procedure and benefits

Unit IV: B2B e-commerce:

Meaning and characteristics of Business to Business (B2B) e-commerce, Key technologies for B2B e-commerce, E- Marketplace models of B2B- Supplier oriented marketplace, Buyer oriented marketplace and Intermediary oriented marketplace

Unit V: e- Payment and e- Banking:

Indian Payment Models, e-payments options: Electronic fund transfer (EFT), Credit cards and debit cards based payment, Use of mobile applications (apps) for e-payment, Meaning of electronic banking, online banking services, benefits of online banking, Future of online financial services in India

Books Recommended

1. Agrawala Kamalesh N and Agrawal Deeksha :
   Bride to Online Storefront, Macmillon India, New Delhi.
2. Agarwala Kamalesh N. and Agrawal Deeksha:
   Business on the Net- Introduction toe- Commerce; Macmillon India, New Delhi
3. Agarwala Kamalesh N. and Agrawal Deeksha:
   Bulls, Bears and The Mouse-An Introduction to Online Stock Market Trading; Macmillillon India, New Delhi.
4. Tiwari Dr. Murli Dr.:
   Education and E-Governance; Macmillon India, New Delhi.
5. Afuah A.and Tucci C.:
   Internet Business Models and Strategies; Mc Graw Hill, New York.

Internal Assessment Scheme

1. Theory paper will carry 60 marks and internal assessment 40 marks
2. 40 % Marks will be based on continue evaluation of the student assignment, class test, seminar and web-site visit /Industrial visit and project report.
3. Student will have to work under the guidance of the teacher and submit project report before fifteen days of the commencement of the theory examination.

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Appendix -

B.Com. III
Semester- VI
Compulsory English

Time: 2 Hours   *Marks: 40*

Prescribed Textbook : Horizons by Board of Editors Published by Orient Blackswan.

UNIT I: PROSE		
SR.NO	PROSE	AUTHOR
1	Sunder Pichai	
2	Mallika Srinivasan	
3	Muhammad Yunus	
4	Introduction to the Right to Information Act, 2005	Pralhad Kachare
UNIT II : POETRY		
1	All the World's A Stage	William Shakespeare
2	How Do I Love Thee	Elizabeth Barrett Browning
3	The Duck and the Kangaroo	Edward Lear
4	Ode To Autumn	John Keats
UNIT III: COMMUNICATION SKILLS		

Employability Skills
- ✓ Leadership Skills
- ✓ Teamwork Skills
- ✓ Time Management
- ✓ Stress Management

Communication Skills
- ✓ Advertising (Types of Advertising & Advertising Media, Techniques of effective advertising)

MARKING SCHEME

UNIT I : Prose : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT II : Poetry : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT III : Communication Skills :

Any TWO out of THREE Questions (2 x 4 = 8 Marks)

8 Multiple Choice Questions on Unit I & II (8 x 1 = 8 Marks)

INTERNAL ASSESSMENT :

Interview Skill : 5 Marks

Home Assignment : 5 Marks

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Appendix - R

B.Com. III
Semester- VI
Supplementary English

Time: 2 Hours   *Marks: 40*

Prescribed Textbook : Golden Harvest An English Coursebook for Undergraduates   by Board of Editors Published by Orient Blackswan.

UNIT I: Prose & Poetry	
SR.NO	**Prose & Poetry**	**AUTHOR**
1	My Struggle for an Education	Booker T. Washington
2	I am Getting Old Now	Robert Kroetch
3	Richard Cory	Edwin Arlington Robinson
4	Father Returning Home	Dilip Chitre
UNIT II : Short Stories		
1	The Thief	Ruskin Bond
2	An Accursed House	Emile Gaborian
3	Freedom at Midnight	Larry Collins and Dominique Lapierre
4	The Last Salvation	R.P.Sisodia.
UNIT III: One Act Play		
	A Marriage Proposal	Auton Chekhor

MARKING SCHEME

UNIT I : Prose : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT II : Poetry : Any THREE out of FOUR Questions (3 x 4 = 12 Marks)

UNIT III : One Act Play :

Any TWO out of THREE Questions (2 x 4 = 8 Marks)

8 Multiple Choice Questions on Unit I & II (8 x 1 = 8 Marks)

INTERNAL ASSESSMENT :

Interview Skill : 5 Marks

Home Assignment : 5 Mark

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Appendix - S

बी.कॉम.भाग-३
विषय :- मराठी
सत्र सहावे

लेखी परीक्षा -४० गुण
अंतर्गत मूल्यामापन – १० गुण

नेमलेले पाठ पुस्तक ''आशय'' भाग-३ (सत्र-५ व सत्र-६)

अनुक्रमणिका

विभाग अ : वैचारिक

१) सावित्रीबाई ुले आणि ताराबाई शिन्दे – डॉ.सदानंद मोरे
२) डॉ.आंबेडकरांची राजकीय भूमिका - डॉ.भा.ल.भोळे
३) अंध ाध्दा विनाशाय - पुरुषो ाम अवारे

विभाग ब : ललित

१) स्मशानातील सोन - अण्णाभा   साठे
२) अजातशत्रु अटलजी - शरद पवार
३) ललाटरेषा – मिल द जाधव
४) ठकन   - दिवाकर सदांशिव

विभाग क : कविता

१) गाभारा - कुसुमा ज
२) बाई - सुखदेव णके
३) निर्धार - अनंत खेळकर
४) धोंडी धोंडी पाणी दे - रवि महल्ले
५) माणसं - अशोक इंगळे

विभाग ड : उपयोजित मराठी

१) जाहीर निवेदन –
२) अहवाल लेखन –

बी.कॉम.भाग-३
विषय :- मराठी
सत्र सहावे

एकूण गुण – ५० गुण
वेळ – २ तास
लेखी परीक्षा -४० गुण
अंतर्गत मूल्यामापन – १० गुण

नेमलेले पुठ पुस्तक : "आशय" भाग-३ (सत्र-५ व सत्र-६)

लेखी परीक्षा गुण विभागणी :

विभाग अ : वैचारिक	०८ गुण
विभाग ब : ललित	०८ गुण
विभाग क : कविता	०८ गुण
विभाग ड : उपयोजित मराठी	०८ गुण
वरिल सर्व विभागांवर आधारित वस्तुनिष्ठ बहुपर्यायी प्रश्न	०८ गुण
एकूण	४० गुण

विभाग "ड" साठी संदर्भ म्हणून "उपयोजित मराठी", "जाहीर निवेदन" "अहवाल लेखन" हे दोन प्रकरण नेमण्यात आले असून त्यावर आधारित दोन लघु ारी प्रश्न विचारण्यात येतील. चार गुणांचा एक प्रश्न प्रत्यक्ष प्रकरणावर आधारित असेल आणि चार गुणांचा दुसरा लघु ारी प्रश्न हा जाहीर निवेदन तयार करणे कवा अहवाल तयार करणे अशा स्वरुपाचा असेल.

प्रश्ननिहाय गुण विभागणी

प्रश्न – १ ला (विभाग अ : वैचारिक) १ दीघा ारी प्रश्न	०८ गुण
प्रश्न – २ रा (विभाग ब : ललित) १ दीघा ारी प्रश्न	०८ गुण
प्रश्न – ३ रा (विभाग क : कविता) २ लघु ारी प्रश्न (प्रत्येकी ४ गुण)	०८ गुण
प्रश्न – ४ था (विभाग ड : उपयोजित मराठी) २ लघु ारी प्रश्न (प्रत्येकी ४ गुण)	०८ गुण

(टिप - वरील सर्व प्रश्नांना अंतर्गत पर्याय राहील.)

प्रश्न – ५ वा (विभाग अ,ब,क,ड) ८ वस्तुनिष्ठ प्रश्न (प्रत्येकी १ गुण) ०८ गुण

(टिप - अभ्यासक्रमातील अ,ब,क, ड या विभागांवर आधारीत प्रत्येकी २ प्रश्न)

अंतर्गत मूल्यामापन

एकूण १० गुणांची अंतर्गत मूल्यमपान परीक्षा राहील.

गुण विभागणी

३) घटक चाचणी (Class Test)	०५ गुण
४) गृहपाठ (स्वाध्याय) (Home Assignment)	०५ गुण

लेखी परिक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उ र्ीण होणे आवश्यक असेल. त्यासाठी किमान गुण खालील प्रमाणे आवश्यक असतील.

लेखी परिक्षा   -   ४० पैकी १६ गुण आवश्यक

अंतर्गत मूल्यमापन   -   १० पेकी ४ गुण आवश्यक

सूचना :-

१)   घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळा चाचणी घे न अंतिम परीक्षेत
     सरासरी गुणदान ा   धरण्यात यावे.

     गृहपाठ हा पाठ पुस्तकांव्यतिरि त इतर कोणत्याही भाषिक कौशल्य विकसित करणा-या विषयवर असावा.

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Appendix - T

बी. कॉम. तृतीय वर्ष

सत्र - षष्ठ

हिन्दी

समय - २ घण्टे   पूर्णांक - ४०

        पाठ्यक्रम का इकाइयों में अंक विभाजन एवम् प्रश्नों का स्वरूप निम्न प्रकार से होगा।

इकाई : एक   -   आधारभूत पाठ्यक्रम के तीन निबंध (४ से ६) से एक दीघा ारी प्रश्न विकल्प के
                  साथ पू ा जायेगा।   १ x ८   ८ अंक

इकाई : दो   -   भाषागत पाठ्यक्रम के पाँच पाठ (६ से १०) से कुल पाँच लघू ारी प्रश्न पू ॅ
                  जायेंगे। जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।   ३ x ४   १२ अंक

इकाई : तीन -   प   विभाग से   : कविता (से १२) से दो कविताओं का केन् ीय भाव विकल्प
                  के साथ पू ा जायेगा ।   २ x ४   ८ अंक

इकाई : चार -   अपाठित ग ांश का सार एवं, शीर्षक पू ा जायेगा ।   १ x ४   ४ अंक

इकाई : पाँच -   इकाई एक, दो और तीन से कुल आठ वस्तुनिष्ठ अतिलघू ारी प्रश्न पू ॅ जायेंगे।
                                                                             ८ x १   ८ अंक

                  आन्तरिक मूल्यांकन   १० अंक

१.   पाठ्यपुस्तक पर आधारित गृहपाठ   -   ५ अंक

२.   पाठ्यपुस्तक पर आधारित मौखिकी   -   ५ अंक

पुस्तक - प्रभास, संपादक - डॉ.निभा उपाध्याय, डॉ. सुशांत ठोके, ॉ.मनोज जोशी
              प्रकाशक - राघव प ब्लशर्स एण्ड डि स्ट्रब्युटर्स, नागपुर

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वाणिज्य स्नातक B.Com भाग ३ (सत्र - ६)

संस्कृत आवश्यक

पुस्तक   : गीर्वाणसारथिः - भाग ३
मुख्य संपादक   - डॉ. भगवान पंडा,
सह संपादक   - डॉ. मीनाी भांदककर, ी आतिश कुलकण
गुण - लेखी परीक्षा   - ४०   वेळ   – २ तास
       अन्तर्गत मूल्यमापन   - १०
       एकूण गुण   - ५०

घटक – १ : ग   पाठ १ व २   - ०८ गुण

घटक – २ : ग   पाठ ३ व ४   - ०८ गुण

घटक – ३ : प   पाठ १ व २   - ०८ गुण

घटक – ४ : प   पाठ ३ व ४   - ०८ गुण

घटक – ५ : वरील ४ घटकांवर आधारीत प्रश्नावली (भाग ६) - ०८ गुण

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प्रश्नपत्रिकेचे स्वरूप

वेळ - २ तास

लेखी परीक्षा   पूर्ण गुण - ४०

प्रश्न (१) दीघा ारी प्रश्न (दोन पैकी एक)   - ०८ गुण

प्रश्न (२) ४ पैकी २ अनुवाद करा (५ ते ६ ओळ चे उतारे) - ०८ गुण

प्रश्न (३) दीघा ारी प्रश्न (दोन पैकी एक)   - ०८ गुण

प्रश्न (४) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)   - ०८ गुण

प्रश्न (५) १० पैकी ०८ वस्तुनिष्ठ प्रश्न   - ०८ गुण

अन्तर्गत मूल्यमापन -   पूर्ण गुण – १०

१) स्वाध्याय   - ०५ गुण

२) मौखिक   - ०५ गुण

   एकूण गुण   - १०

टीप - लेखी परी ी व अंतगत मूियमापन या दोीही परीींमिये ितंिपणे उिीणहोणे आवियक असेल.
       ियासाठी किमान गुण खालील िमाणे आवियक असतील.

लेखी परी ी   - ४० पैकी १६ गुण आवियक
अंतगत मूियमापन   - १० पैकी ०४ गुण आवियक

संस्कृत आवश्यिक या विषयासाठी प्रतावित अभ्यासक्रम

सहावेस□

ग□ विभाग

१) कत□बोधः   - मुकुल कानिटकर
२) अपु□जातकम्   - जातकमाला
३) ध्द□याऽसि   - कथामृतम्
४) कुमार □यभि□निम् - उ□रिरामचरितनाटकम्

प□ विभाग

१) य□गृहवणनंम्   - मेघदूतम्
२) आमिषटकम्   - □तो□वा□यः
३) सुभाषितानि   - सुभाषितसं□हिः
४) ऋतुचया□   - साथर्वी□भिटः

□विली भाग ६

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<div align="right">**Appendix - V**</div>

वाणिज्य स्नातक भाग-३
सेमिस्टर- ६
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास   लेखी परीक्षा-- ४०
                                        अंतर्गत मूल्यमापन -१०
                                        एकूण-- ५०

युनिट-१
     मिलिन्दपन्हो   --   १) नागसेनस्स पब्बज्जा   ०८ गुण
                                 २) नागसेनस्स धम्मदेसना
                                 ३) नागसेनेन मिलिन्दस्स पठमसमागमो

युनिट-२
     थेरगाथा   --   १) अंगुलिमाल थेर   ०८ गुण
     खु कपाठ   --   २) महामंगल सु ।

युनिट-३
     जातकसु ।   --   १) म ।भ ।क जातक   ०८ गुण
                                 २) उल्लक जातक

युनिट-४
                  --   १) पालि निबंधो   ०८ गुण
                                 २) सामान्य माहिती

युनिट-५
     युनिट क्रमांक १ ते ४ वरील वस्तुनिष्ठ प्रश्न सोडवा   --   ०८ गुण

अंतर्गत मुल्यमापन
      १) घटक चाचणी   --   ०५ गुण
      २) स्वाध्याय   --   ०५ गुण

सूचना :-
१) घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळ चाचणी घे न अंतिम परीक्षेत सरासरी गुणदान ा धरण्यात यावे.
२) गृहपाठ (स्वाध्याय) हा अभ्यासक्रमावरील असेल.

वाणिज्य स्नातक भाग-३
सेमिस्टर- ६
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास   लेखी परीक्षा-- ४०

प्रश्नपत्रिकेचे स्वरुप

प्रश्न - १	अ) भाषांतर करा (दोन पैकी एक)	--	४ गुण
	ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	--	४ गुण
प्रश्न - २	अ) संदर्भासह गाथांचे स्पष्टीकरण (दोन पैकी एक)	--	४ गुण
	ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	--	४ गुण
प्रश्न - ३	अ) लघु ारी प्रश्न सोडवा (दोन पैकी एक)	--	४ गुण
	ब) दिघा ारी प्रश्न सोडवा (दोन पैकी एक)	--	४ गुण
प्रश्न - ४	सामान्य माहिती लिहा	--	४ गुण
	पालि निबंध	--	४ गुण
प्रश्न - ५	वस्तुनिष्ठ प्रश्न सोडवा, (कोणतेही चार) (प्रत्येकी दोन गुण)--८ गुण

Appendix - W

Urdu Compulsory
B.Com.III
Semester- VI

Theory: 40 Marks   Time: 2 Hours

Text prescribed for study: **ROOH-E-ADAB (Part III)**

(As per Model curriculum of the UGC for B.Com III Semester VI and published by the Aadhaar Publication Amravati.)

Unit-I : PROSE

1. Leader (لیڈر)   Sultan Haidar Josh (سلطان حیدر جوش)

Unit-II : PROSE

1. Khawab Khawab Safar (خواب خواب سفر)   Ram Lal (رام لعل)

2. E-Commerce (ای-کامرس)   Edit by Dr. Shaheda Munaf (مرتب- ڈاکٹر شاہدہ مناف)

Unit-III : Poetry (نظم)

1. Qaum Ki Ladkiyon Se Khitab (قوم کی لڑکیوں سے خطاب)   Brij Narayan Chakbast (برج نارائن چکبست)

Unit-IV : COMMUNICATION SKILL (ترسیلی مہارت)

1. Report Writing

Unit-V : MCQs

Based on Unit. I, II and III

Distribution of Marks (40 : 10)

A : Theory - 40 Marks

Question No. 1 Prose

Any two long answer questions to be attempted out of four each carrying four marks based on

" Leader (لیڈر) "   Marks: 4X2= 08

Question No. 2 Prose

a)   Any two short answer questions to be attempted out of four each carrying two marks based on

" Khawab Khawab Safar (خواب خواب سفر) "   Marks: 2X2= 04

b)   Any two short answer questions to be attempted out of four each carrying two marks based on

"E-Commerce (ای کامرس)"   Marks: 2X2= 04

Question No. 3 Poetry

Any two stanzas to be attempted out of three each carrying two marks based on poem

" Qaum Ki Ladkiyon Se Khitab (قوم کی لڑکیوں سے خطاب)"   Marks: 4X2= 08

Question No. 4 COMMUNICATION SKILL

1. Report Writing
   (Any two out of four)   Marks4X2= 08

Question No. 5

Multiple Choice Questions based on Unit.I,II and III   Marks: 8X1= 08

B.   Internal Assessment -   10 Marks

1. Viva-voce   05 Marks

2. Assignment   05 Marks

Appendix -

B.Com. III
Semester - VI
Management Accounting

Time: 3 Hours   *Marks: 80*

Objectives:
*   1. This course exposes the students to the basic concepts and tools used in Management Accounting.*
*   2. To provide an understanding of the applications of Management Accounting techniques for management decision making.*

Unit I: 1.1: Management Accounting: Meaning; Features; Advantages; Limitations; Scope and Functions of Management Accounting.

1.2: Comparison: Between Management Accounting and Financial Accounting, Between Management Accounting and Cost Accounting.

Unit II:2.1: Break-Even-Analysis: Concept, Uses and Limitations of Break-Even-Analysis, Margin of Safety, Contribution, Use of P/V ratio for decision making, Cost-Profit-Volume Relationship, Fixed Cost Variation.

2.2: Problems on Break Even Analysis.

Unit III: 3.1: Ratio Analysis: Meaning of Ratio Analysis, Advantages and Limitations of Ratio Analysis

3.2: Problems on Profit and Loss Account Ratio.

3.3: Simple Problems on Balance-Sheet Ratio: Current Ratio; Quick Ratio and Proprietary Ratio

Unit IV: .1: Budget: Meaning and Definition of Budget; Characteristics of Budget; Types of Budget.

.2: Problems on Cash budget

Unit V: .1: Budgetary Control: Meaning and Definition of Budgetary Control, Objectives of Budgetary Control; Limitations of Budgetary Control.

.2: Problems on Flexible Budget.

Books Recommended

1. Khan M.Y. and Jain P.K. : Management ACcounting; Tata Mcgraw- Hill Publishing Co. Ltd., New Delhi.
2. Kaplan R.S. and Atkison A,A, : Advanced Management Accounting; Prentice India International.
3. S.P. Gupta : Management Accounting; Sahitya Bhawan, Agra
4. Man Mohan Goyal: Principles and Practice of Management Accounting
5. N. Sarkar : Management Accounting
6. Hingorani : Management Accounting
7. R.K. Sawlikar; Management Accounting ; Das Ganu, Prakashan, Nagpur.

हिन्दी

१. आई.बी.स सेना , प्रबंधन लेखांकन
२. एस.पी.गुप्ता, प्रबंधकीय लेखाविधी

मराठी

१. देशकर सेठी , प्रबंधन लेखांकन
२. प्रा. एस.एन.पजरकर , प्रंबंधकीय लेखांकन , किताब महल, नागपुर

डॉ.प्रमोद टग , परिचय आणि प्रबंधकीय लेखांकन, सर साहित्य कें , नागपुर

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Appendix - Y

B.Com. III
Semester - VI
Economics of Development

Time :Three Hours   Marks   0

Course Outcome: To provide an insight into various growth models and their applicability in present scenario.

Unit 1 Economic Development
1.1 Economic Underdevelopment:Concept, Definition and Indicators
1.2 Economic Development: Concept, Definition and Indicators
1.3 Economic Growth:Concept, Definition and Indicators
1.4 Economic Development V/s Economic Growth

Unit 2 Economic Growth Models
2.1Harrod&Domer model
2.2 Classical theories of Development: Adam Smith & David Ricardo
2.3 Karl Marx Theory of Development
2.4 Schumpeter and Capitalistic Development

Unit 3 Economic Growth Models
3.1Vicious Circle of Poverty
3.2GurnarMirdals Theory of Circular Causation
3.3Lewis theory of Unlimited Supplies of Labour
3.4Big Push Theory of Development

Unit   Growth Balanced & Unbalanced
4.1Balanced Growth: Concept, Essentials and criticisms, Rodan'sAppraoch
4.2 Duseanbari Effect, Prof. Nerks Approach of Balanced Growth
4.3 Unbalanced Economic Growth: Concept, Nature and Principle
4.3 SEZ: A Solution over Unbalanced Growth in India

Unit   Development of Capital: Human & Financial
5.1 Indicators and Importance of Human Resource Development
5.2 Quality of Human Capital-Role of Education and Health
5.3 Requirement of Capital Formation: Desired Rate of Growth and Incremental Capital-output ratio
5.4 Domestic Savings and Capital Formation in India: Trends and Analysis

Suggested Readings:

a)Michel .P.Todaro and Stephen .C.Smith ,Economic Development ,Pearson Publication
b) Ahluwalia ,MontekSingh,Economic Development and Planning,The new Oxford Companion
c) Indian Economy and Reforms, Taxmann Publication
d) Mishra and Puri,Himalaya Publication Indian Economy
e) Dr. G.N.Zamare, Pimpalure Publication, Indian Economic Development & Economical Environment
e)Ashwathappa,Himalaya Publication Business Environment,
f)CherunilamFrancis ,Business Environment ,Himalaya Publication

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Appendix - Z

B.Com. III
Semester - VI
COMPANY LAW

Time : 3 Hours   **Marks: 0 Theory**

Unit I – Introduction

1.1 – Introduction; definition, silent features of company, Act 2013
1.2 – Formation of company, stages of formation
1.3 - Promoters, Functions of promoter,Duties and liabilities of promoter,
1.4 -Types of company,

Unit II – Incorporation of company

2.1– Incorporation of company
2.2 – Prospectus of company
2.3– MOA of company
2.4– Article of company

Unit III – Share capital of company

3.1 – Share capital of company, Types of share and debenture
3.2 – Issue of shares, Allotment, calls and forfeiture share
3.3 – Transfer & transmission of share
3.4-Share certificate and share warrant

UNIT IV - SECURITIES MARKET:

.1- Brief history of Stock Exchange, Study of functions of BSE and NSE
4.2- Stock Exchanges and its importance.
4.3 - Primary Market and Secondary Market: Components of Primary Markets
4.4 - D-Mat Account: Definitionand Procedure.

UNIT – V   COMPANY SECRETARY AND COMPANY MEETINGS:

5.1 - Appointment, Duties and Responsibilities of Company secretary
5.2– Types of company meeting: Annual and General meeting of company, Statutory meeting of
   Company, – Extraordinary meeting
5.3 – Notice of meeting & Agenda of meeting, proceedings of meeting,
5.4 - Voting methods of meeting and quorum. Minutes proceedingof meetings,its contents

Reference books:

1. Company Law (volume-l) Rakesh Bhargava: Taxmann 's, New Delhi.
2. Company Act-2013: Ravi Puliani, Mahesh Puliani, Bharat Law House Pvt. LTD., New Delhi.
3. Principles of Company Law: M.C. Shukla, S.S. Gulshan,S Chand Company LTD., New Delhi.
4. ATax Book of Company Law: P.P. Gogna.Chand & Company, New Delhi.
5. Company Law: Ashok K. Bagrial, Vikas Publishing House Pvt. LTD. Bangalor
6. Indian Company Law: Awartar Singh, Sultan Chand & Sons, New Delhi
7. Guide to Company Law: Procedures, M.C. Bhandari,Wadhwa & Company, Nagpur
8. Company Law: H.K Saharaya, Universal Law Publishing Co., New Delhi
9. कंमनी कायदा: िकरण चंद नेरकर ,होते, वषािठाकरे आिण सी एस कांिबले, साई ियोित पिlिवेशन , नागपूर
10. कंमनी िविध: डॉ. आर. एल. नौलखा. नौलखा, रमेश बुक िडपो, जयपुर
11. कंमनी आिधिनयम व अंकेिण: डॉ. डी.पी. जैन, डॉ. आर.एम.एस. मािलक,धनपतराय पिlिवेशन कंमनी , नईिदिलॱ
12. कंमनी साचवाची कायपिित: ए. एस. उखडकर.

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<div align="right">Appendix - AA</div>

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B.Com. III
Semester - VI
Process Business- II

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Time :3 Hours   **Marks   0**

Objectives : The course aims to educate the student with the different factors which effect business. This course aims to develop ability to understand business environment as well as process in order to analyses theopportunities and take decisions accordingly.

Unit - I

Business Policy as a study; Its Nature & Importance, Development & Classification of Business Policy; Mechanism of Policy making.

Unit - II

Levels of Management : Concept, types & responsibilities

Unit - III

Corporate Planning ; Concept of Long term Planning, Strategic Planning Nature, Process Importance.

Unit - IV

Strategy Formulation: Concept, Process & Affecting Factors. Strategy Evaluation : Process, Environmental Analysis.

Unit - V

International business environment - The economic environment; social and cultural environment, Political legal and regulatory environment, natural environment. Technological environment.

Reference Books :-
1. Business Organisation and Industrial Management - Daver.
2. Environmental Economics - Hedge Lan.
3. International Business Environmental . Sundaram & Black Prentice Hall, New Delhi.
4. Business Process Management. - By Routledge
5. Managing performance through Business Processes, Dominique Thiault.

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<div align="right">Appendix - AB</div>

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B.Com. III
Semester - VI
Co-operative Business- II

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Time :3 Hours   **Marks   0**

Objectives : To understand the structural and functional dynamics of Co-operatives.

Unit - I

Indian Economy :- Its resource base - optimizing resources for balanced economic growth; integration of primary, secondary and tertiary sectors- the rolw of co-operatives, Co-operation and other business enterprise.

Unit - II

Primary Sector Co-operatives :- Constitution, Structure, Working Performance of agricultural and allied cooperatives, their Problems and prospects.

Unit - III

Scondary Sector Cooperatives :- Constitution, structure and working Performance of manufacturing / industrial/ processing cooperatives their problem and prospectus.

Unit - IV

Tertiary Sector of Cooperatives :- Constitution, Structure and working performance of education, medical, tourism, housing, banking & insurance, marketing and consumer Coopeatives - their problems and prospects.

Unit - VI

Cooperative Development Agencies :- Constitution and working of ICA, NCDC, NCUI, NABARD, NDDB, RBI.

Reference Books :-

1.   Asian Drama - Gunna Mirdal
2.   Dubhuashi, P.R. Principles and philosophy of Cooperation, VAMNICOM, Pune, 1970
3.   Hajela T.N., Principles, Problems and Practices of Cooperation , Konark Publishers, New Delhi, 2000
4.   Ian Mac Pherson, Cooperative Principles for the 21 st Centruy, ICA, Geneva 1995.
5.   Krishnasamy O.R. and Kulandaiswamy, V., Cooperation : Concept and Theory, Arudra Academy.
6.   Krishnasamy O.R. Fundamentals of Cooperation., S. Chand & Co., New Delhi., 1985
7.   Mathur B.S. , Cooperation in India , Sahithya Bhavan Publishers, Agra, 2000
8.   Paul Lambert, Studies in social philosophy of Cooperation, Cooperative Union Ltd.,Manchester, 1963
9.   Plunkett Foundation, The World of Cooperative Enterprises, 1996.
10.   Puri, S.S. Ends and Means of Cooperation, NCUI, New Delhi, 1979.
11.   Rajagopalan R.Rediscovering Cooperation (Vo. I,II,III) IRMA Anand 1996.
12.   Ravichandran K and S. Nakkiran(2009), Cooperation: Theory and Practice, Abhijit publication New Delhi.
13.   Sivaprakasam, P. Personnel Management in Central Cooperative Banks in India, Kanishka Publication, New Delhi., 1993.
14.   Socialisation & Inclusion - Amarthiya Sen.

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Appendix - AC

B.Com. III

Semester - VI

Indian Insurance System II

Time :Three Hours   **Marks   0**

     Course Outcome: To provide an insight in to the regulating and functioning of Insurance Business

Unit I: Insurance corporations:

     1.1 LIC: Formation, Management &Functions

     1.2 LIC: Role and Importance in Economic Development

     1.3 New India Assurance Company: History, Management, Functions

     1.4 New India Assurance Company: Role and Importance in Economic Development

Unit II: Insurance Regulations and Acts
     2.1 IRDA: History, Role and Limitations
     2.2 IRDA Act 2002
     2.3 Life Insurance Act 1956
     2.4 General Insurance Business Act 1972

Unit III Career in Insurance-Agent
     3.1 Definition, Meaning and Functions of an Agent
     3.2 Procedure for obtaining an agency
     3.3 Economic Reward of an agent
     3.4 Suspension and Termination of an Agency

Unit IV Insurance Marketing
     4.1 Marketing Dimensions of Insurance Industry
     4.2 Distribution Patterns and Channels
     4.3 Pricing and Promotion of Insurance policies
     4.4 Advertising and Branding of Insurance policies

Unit V Current Scenario of Insurance Industry
     5.1 Information Technology and Insurance Procedure
     5.2 Insurance and Social Security
     5.3 PradhanmantriJeevanjyotiBimaYojana&PradhanmantriSurakshaBima
     Yojana
     5.4 Ayushman Bharat-Pradhanmantri Jan AaroagYojana

Suggested Reading:
1) Insurance, Dr. C.J.Joshi, PhadakePrakashan, Kolhapur
2) Insurance Principles and Practice, M.N.Mishra, S.Chand& Company, New Delhi
3) Principles and Practices of Insurance, Dr. P.Periasamy, Himalaa Publishing Houses
4) Insurance Regulatory Development Act
5) Life Insurance Corporation Act 1965

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Appendix - AD

B.Com III SEM VI
Indian Banking System-II

Time : 3 Hours   Marks: 0

Course Outcome: To provide insight into the various functions of retail banks and associated proceduralaspects.

Unit I: Retail Banking
1.1 Concept, Role and Importance
1.2 Scope and Coverage
1.3 Objectives and Importance
1.4 Future of Retail Banking in India

Unit II: Deposits: A Banking Shake hand
2.1 Concept, Role and Importance
2.2 Types of Deposits and their relevance
2.3 Procedure and formalities (KYC)
2.4 Prime minister JandhanYojana: Concept, Objectives and Importance

Unit III: Advances: Ultimate Banking Purpose
3.1 Concept, Role and Importance
3.2 Types of Advances and their relevance
3.3 Procedure and formalities
3.4 Prime minister Mudra Yojana:Concept, Objectives and Importance

Unit IV: Agency Functions: Trusteeship
4.1 Concept, Role and Importance
4.2 Types of Agency Functions and their relevance

4.3 Procedure and formalities

4.4 Agency functions towards Government

Unit V: Online Banking: Modern Incarnation

5.1 Internet Banking: Concept, Procedure and Precautions

5.2 Mobile Banking:Concept, Procedure and Precautions

5.3 Mobile Payment Wallets: Concept, Procedure and Precautions

5.4 Plastic money:Concept, Procedure and Precautions

Suggested Readings:

1) S. Natarajan& Dr. R. Parameswaran,Indian Banking,S.Chand
2) Dr. gangadharKayande-Patil, Fundamentals of Banking, ChaitanyaPublicaitons, Nashik
3) Panandikar S.G. and Mithani D.M., Banking in India, Orient Longman
4) Sayers R.S.: Modern Banking, Oxford University Press
5) Shekhar and Shekhar: Banking Theory and Practice, Vikas Publication House, New Delhi
6) Tennan M.L.: Banking Law and Practices in India, Indian Law House , New Delhi
7) Dr. SudhirBodhankar, Dr. MedhaKanetkar, Indian Banking System, Sainath Publication, Nagpur

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Appendix - AE

B.Com. III
Semester VI
Internet and World Wide Web - II

Time : 3 Hours   **Marks: 0 Theory**

Objective : The course aims at familiarizing the students with the basic concepts and ground rules of Internet and the various services it offers including designing of website and how to access information from depositories in the world wide web.

Unit I :

1.1 Web Browsing: History of web Browsers, Basic Functions of Web Browser,Types of WebBrowsers.

1.2 Features of: Internet Explorer, Google Chrome, Mozilla Fire Fox , UC Browser and Opera Mini

Unit II:

2.1: Web Directory: Meaning of Web Directory, Features of Web Directory, Types of Web Directory.

2.2: Search Engines: Meaning of Search engines, history of search engines, guideline for effective searching.

2.3: Features of Google , Bing and Yahoo Search engines

Unit III:

3.1: Social Networking Websites: Meaning of social networking website, Features of Social networking websites, objectives of social networking website. Features of Facebook, Instagramand Tweeter Website.

3.2: Mobile Applications (App): Meaning of Mobile App, Features of Mobile App, Feature of What's App , Google Play Store and BHIM App.

Unit IV:

4.1: Google Drive: Meaning of Google Drive, Features and Uses of Google Drive

4.2: Google Forms: Meaning of Google Forms, Features of Google Forms, Creating of Google Forms, sending Google forms for survey.

4.3: Google Classroom: Concept of Google Class room, feature of Google Class Room, Creation of Google Class room

Unit V:

5.1: M.S. FrontPage Express: Concept & features of MS Front page and its Important, Opening window of Front page

5.2: Using MS Front Page to create webpage: Entering & editing text, Inserting Images, Symbol, Labels and forms.

Note:For practical: Browsing & surfing web browsers, Creation of Google forms & classroom of webpage by using MS Front page. 2 Practical batch will be 20 students

Books Recommended:

1. AgarwalaKamlesh N. and AgrawalaDeeksha
   Bridge to theonline storeftont:Macmillon India, New Delhi
2. Phillips Lee Anne,
   Practical HTML 4, Prentice Hall New Delhi.
3. MinoliDeniel, Minoli Emma.
   Web Commerce Technology Hand book, Tata MC:Graw Hill, New Delhi.
4. Deitel Harvey M. and Deitel Paul J and Neita T.R. Complete Internet and World Wide Web programming Training courses, Prentice Hall, New Delhi.
5. इंटरनेट आणि वर्ल्ड वाईट वेब (WWW). Prof. S.M. Kolte, Pimpalapure& Co. Publishers, Nagpur.
6. Internet and World Wide Web, Prof. UdayShrikrushna Kale, Shri SainathPrakashan, Dharmpeth, Nagpur-10

Scheme of Examination

Year	Paper	Total Marks		Minimum Passing Marks	
		T	P	T	P
B.Com.	Internet and				
Semester VI	World Wide Web- II	0	0	2	1

Division of Marks for Practical

Record Preparations	:	10 Marks
Practical	:	15 Marks
Description	:	10 Marks
Viva	:	5 Marks
Total	**:**	**0 Marks**

Appendix - AF

B.Com. III
Semester VI
e-COMMERCE- II

Time : 3 Hours   **Marks: 0**

Objective: The objective of the course is to acquaint the students with the internet- based e-commerce business models, internet marketing and e-governance.

Unit I: Internet e-commerce Business Models:

Social media model, advertising model, retail model, hybrid model, merchant model, informational model, drop-shipping model and revenue model.

Unit II: B2C Internet Marketing

Meaning of online marketing or internet marketing, online marketing strategies, marketing channels, internet branding, online publishing and advertising.

Unit III: B2B Online Marketing

Use of internet based electronic data interchange (EDI), Benefits of online marketing in B2B e-commerce, procurement reengineering, just in time delivery, online marketing issues.

Unit IV: E-governance:

Meaning of e-governance and e-government, Objectives of E-governance, Private sector interface in E-Governance, Concepts of government to Business (G2B), Business to Government (B2G), Citizen to Government (C2G),

Unit V: E- Governance Models

Application of Internet EDI in E-governance, E-governance in India, E-Governance Models, Comparative Analysis Model, Wider Dissemination Model, Critical Flow Model,   E-advocacy Model

Books Recommended

1. Agrawala Kamalesh N and Agrawal Deeksha :
   Bride to Online Storefront, Macmillon India, New Delhi.
2. Agarwala Kamalesh N. and Agrawal Deeksha:
   Business on the Net- Introduction to e- Commerce; Macmillon India, New Delhi
3. Agarwala Kamalesh N. and Agrawal Deeksha:
   Bulls, Bears and The Mouse-An Introduction to Online Stock Market Trading; Macmillillon India, New Delhi.
4. Tiwari Dr. Murli Dr.:
   Education and E-Governance; Macmillon India, New Delhi.
5. Afuah A.and Tucci C.:
   Internet Business Models and Strategies; Mc Graw Hill, New York.

Internal Assessment Scheme

1. Theory paper will carry 60 marks and internal assessment 40 marks
2. 40 % Marks will be based on continue evaluation of the student assignment, class test, seminar and web-site visit /Industrial visit and project report.
3. Student will have to work under the guidance of the teacher and submit project report before fifteen days of the commencement of the theory examination.

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SANT GADGE BABA AMRAVATI UNIVERSITY AMRAVATI

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinances Booklet the various conditions/ provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.
Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.

Ordinance No. 6/2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba
Amravati University.

DIRECTION

No. 13/2009   Date : 11/06/2009

Subject :   Examinations leading to the Degree of Master of Science in Applied Electronics (Two-Year Course ....Semester Pattern)

Whereas the draft Ordinance and the schemes of teaching & examinations of Ist to IVth Semesters of Master of Science in Applied Electronics course were accepted by the Academic Council vide Item No. 22 (A) (R-1) in its meeting held on 05-05-2009 as per the Credit Based System as per the guidelines given by the University Grants Commission, New Delhi,

AND

Whereas the Academic Council has referred the draft Ordinance along with Schemes of Examinations to the Ordinance Committee,

AND

Whereas admissions to the Two Year Post Graduate Degree Course in Master of Science (Applied Electronics) are to be made in the Academic Session 2009-2010,

AND

Whereas the matter for admission of the students at the examinations is required to be regulated by an Ordinance,

AND

Whereas the schemes of teaching & examinations of Ist & IInd Semesters of Master of Science in Applied Electronics course are to be implemented from the academic session 2009-2010,

AND

Whereas the schemes of teaching & examinations are required to be regulated by the Regulation,

AND

Whereas the process of making an Ordinance and the Regulation is likely to take some time,

AND

Whereas syllabus for Ist & II Semesters of Master of Science in Applied Electronics course is to be sent for printing.

Now, therefore, I, Dr.Ku.Kamal Singh, Vice-Chancellor of Sant Gadge Baba Amravati University in exercise of powers confirmed upon me under sub section (8) of Section 14 of the Maharashtra Universities Act, 1994, hereby direct as under :

1.   This Direction may be called "Examinations leading to the Degree of Master of Science in Applied Electronics (Two - Year Course .... Semester Pattern), Direction, 2009.

2.   This Direction shall come into force w.e.f. the Academic session :-
   i)   2009-2010 for Ist & IInd Semester M.Sc. (Applied Electronics), &

   ii)   20010-2011 for IIIrd & IVth Semester M.Sc. (Applied Electronics)

3.   In this Direction the letters, words, figures:-
   a)   "B.Sc." means B.Sc. of this University with Physics or Electronics or Computer Science with Mathematics at +2 level as one of the subjects or Bachelor of Computer Science.

OR

   Degree of any other Statutory University recognized by Sant Gadge Baba Amravati University as equivalent thereto.

   b)   "University" means Sant Gadge Baba Amravati University.

4.   The Degree of Master of Science in Applied Electronics shall be awarded to an examinee who, in accordance with the provisions of this Direction qualifies himself/ herself for the Degree.

5.   (i)   The duration of the course shall be two academic years
        (ii)   There shall be four semester examinations leading to the Degree of Master of Science (Applied Electronics) (First, Second, Third and Fourth Semester M.Sc.).
        (iii)   The main examination of first and third semester of M.Sc. shall be held by the university in winter and supplementary examination in summer every year. And main examination of second and fourth semester of M.Sc. will be held in summer and the supplementary examination in winter every year.

6.   For purpose of instruction and examination the student shall study sequentially.

7.   The Period of Academic session / Term shall be such as may be notified by the University.

8.   The examination referred to in para (5) above shall be held at such places and on such dates as may be notified by the university.

9.   Subject to his/ her compliance with provisions of this Direction and of other Ordinances (Pertaining to examinations in General) in force from time to time, the applicant for admission, at the end of the course of a particular term(s) shall be eligible to appear if:
   i)   he /she satisfied the conditions in the Table I.
   ii)   he / she has prosecuted a regular course of study in the University/ College affiliated to the University
   iii) he /she has in the opinion of the Head of the Department / Principal shown satisfactory progress in his / her studies.

TABLE I

Name of Exam	The student should have passed the examination of	The student should have completed the session / term satisfactorily
First SemesterM.Sc.	B.Sc. or equivalent	—
Second SemesterM.Sc.	——	First SemesterM.Sc.
Third Semester M.Sc.	——	Second SemesterM.Sc.
Fourth Semester M.Sc.	——	Third SemesterM.Sc.

10. The system of evaluation will be as follows: As a part of internal assessment, each assignment/test/viva-voce/minor project/design/ report will be evaluated in terms of marks. The marks for separate assignments and the final (semester-end) examination will be added together and then converted into a grade and later a grade point average. Results will be declared for each semester and the final examination will give total grades and grade point average.

11. A ten point grade system for the evaluation of the performance of the examinee will be followed for M.Sc. in Applied Electronics course. The conversion of marks obtained by the examinee into grade points is detailed in examination scheme.

12. Based on grade points obtained in each subject in the semester, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed and described in examination scheme.

13. Marks will be given for all examinations; they will be converted into grades. The relationship among marks obtained, grade and grade points is explained in the scheme and syllabus through tables, equations and illustrative example. The semester and final grade sheets and transcripts will have only grades and grade points average. For computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average), the correspondence between Final grade points and letter grades will be as shown in Table II

TABLE II
Correspondence between Grade Points and Grades

Grade Points	Final Grade
9.00-10.00	A+
8.00 – 8.99	A
7.00-7.99	B+
6.00-6.99	B
5.50 – 5.99	C+
5.00 – 5.49	C
4.00 – 4.99	D
0	F

14. If the GPA (Grade Point Average) is higher than the indicated upper limit in the three decimal digit, then the student be awarded higher final grade (e.g. a student getting GPA of 5.991 shall be awarded 'B').

15. i) The scope of the subject shall be indicated in the syllabus.
    ii) The medium of instruction and examination shall be English

16. There shall be no classification of examinees successful in First Semester, Second Semester, Third and Fourth Semester M.Sc. examination, separately.

17. To pass, a student shall have to get minimum 4 Grade points in each theory subject and 5 Grade Points in each practical/Laboratory work.

18. Internal Assessment answer books may be shown to the students concerned.

19. Any candidate who wishes to improve his/her Division/Grade at the M.Sc. examination of this University shall be eligible to appear for the examination again under this Direction in the same subject or group of subjects as the case may be for improving the Division/ Grade. In such case, the provision of Ordinance relating to the improvement of Division/Grade shall apply.

20. The provision of Ordinance relating to the condonation of deficiency of marks for passing examination and Ordinance relating to exemption and compartment shall apply to the examinations under this Direction.

21. An examinee who does not pass or who fails to present himself/ herself for the examination shall be eligible for readmission to the same examination, on payment of fresh fees and such other fees as may be prescribed.

22. As soon as possible after the examinations, the Board of Examinations shall publish a result of the examinee. The result of Final M.Sc. examinations shall be classified as above and merit list shall be notified as per Ordinance No.6.

23. Notwithstanding anything to the contrary in this Direction no one shall be admitted to an examination under this Direction, if he/she has already passed the same examination or an equivalent examination of any statutory University.

24. i) The examinees who have passed in all the subjects prescribed for all the examinations shall be eligible for award of the Degree of Master of Science in Applied Electronics
    ii) The Degree Certificate in the prescribed form, shall be signed by the Vice-chancellor.

25. The schemes of teaching & examinations for M.Sc. (Applied Electronics) course, Computation of SGPA & CGPA and Illustrative Example for Results in Grade Point System shall be as provided under Appendices A, B and C appended with this Direction.

Sd/-
Dr. Kamal Singh
Vice-Chancellor

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SYLLABUS PRESCRIBED FOR
TWO YEAR P.G. DEGREE COURSE
MASTER OF SCIENCE
(APPLIED ELECTRONICS)

SEMESTER PATTERN

SEMESTER : FIRST

1AE1   ELECTRICAL ENGINEERING AND NETWORK ANALYSIS

Unit I   :   Fundamentals of Electrical Engineering

Basic concept of voltage, current, work, power and energy, relationships between them, Resistance, resistivity, conductivity, Ohm's law, series and parallel connections of resistors, voltage and current division, Star to delta and delta to star transformations, Kirchoff's laws applied to dc circuits, single phase AC Circuits (sinusoidal waveforms only), R-L-C series circuits and parallel circuits, phasor diagram, impedance triangle, active reactive power.

Unit II   :   Single phase transformer

Principle of operation, construction, EMF equation of transformer, voltage transformation ratio, transformer on no load, transformer on load, losses in transformer, voltage regulation of transformer, efficiency of transformer, condition for maximum efficiency.

Basic Network Elements and sources

Network elements, circuit components, assumptions for circuit analysis, voltage and current sources, Standard input signals, source transformations, mesh and node analysis.

Unit III   :   Graph theory and network equations

Graph of a network, Trees, co trees and loops, Incidence matrix, Cut-set matrix, Tie set matrix and loop currents, possible trees, analysis of a network using Kirchoff's laws, network equilibrium equation and Duality network transformations.

Unit IV   :   Laplace Transformation and its applications

Laplace transformations, basic theorems, Laplace transform of some important functions, initial and final value theorem, gate function, impulse function, Solutions of linear differential equations with constant coefficients, Heaviside's partial fraction expansion.

Unit V   :   Network Theorems

Introduction, Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem applied to DC and AC circuits.

Unit VI   :   Two-Port Network

Open circuit impedance parameters, short circuit admittance parameters, Transmission or chain parameters, Hybrid parameters, Interrelationships between the parameters, Interconnection of two port networks, Input impedance in terms of two port parameters, Output impedance in terms of two port parameters.

Text Books:

1)	De Carlo Lin	:	Linear Circuit Analysis, 2e, Oxford University Press
2)	D. Roy Choudhary	:	Network and Systems (New Age International/ Wiley eastern ltd)
3)	V .N. Mittle	:	Basic Electrical Engineering, (TMGH)

Reference Books:

1)	M.E. Van Valkenburg	:	Network analysis 3rd Ed. (PHI)
2)	Iskv Iyer	:	Circuit Theory, (TMGH)
3)	Edminister	:	Electric Circuits, Schaum Outline Series

1AE2   ELECTRONIC DEVICES AND CIRCUITS

Unit I   :   P-N Junction diode theory, Rectifiers - Half wave, full wave and bridge, Linear wave shaping using RC circuits, Filters-C, LC and their analysis, analysis of clipping and clamping circuits using diodes and switching transistors, Zener diode and its application.

Unit II   :   Theory and Analysis of Bipolar Junction transistor, Configurations, transistor as a switch, 'Q' and stability factor, Methods of biasing, their needs, 'h' Parameter (CE,CB,CC analysis)

Unit III   :   FETs (JFET & MOSFET): Types, Characteristics and parameters (μ, gm, Rds), Biasing of FET, MOS capacitor, Equivalent circuits of JFET and MOSFETs, CMOS characteristics

Unit IV   :   Study of typical transistor amplifier circuits:

BJT: RC coupled amplifier, Transformer coupled amplifier, Direct coupled amplifier, Cascode stage, Emitter follower, Darlington emitter follower, Bootstrap emitter follower, Feedback amplifiers.

FET Amplifier-Common Source & Common Drain.

Unit V   :   Class 'A', 'B', 'AB' and 'C' amplifiers, Calculations of power gain, efficiency, power dissipation and distortion, Oscillators, their criteria, Hartley, Colpitts and R-C Oscillators, Crystal Oscillator.

Unit VI **:** Theory, Construction and applications of Schottky diode, Tunnel diode, Varactor diode, LED, Photo diode, Phototransistor, PIN diode.

Text Books:

1)	David A.Bell	:	Electronic Devices and Circuits, Oxford University Press
2)	Millman and Halkias	:	Electronic Devices and Circuits, TMGH
3)	Millman and Grabel	:	Microelectronics (TMGH)
4)	Millman and Taub	:	Pulse, Digital and Switching wave forms (TMGH)

Reference Books:

1)	Sedra/Smith	:	Microelectronics Circuits 5e, Oxford University Press
2)	R.L.Boylestad & L.Nashelsky	:	Electronic Devices & Circuit Theory (6th Edition,) , Pearson Education.
3)	Aloke K.Dutta	:	Semiconductor Devices and Circuits, Oxford University Press
4)	Millman & Halkias	:	Integrated Electronics (TMGH)

1AE3 OBJECT ORIENTED PROGRAMMING C++

Unit-I **:** Introduction to object oriented programming, comparison with structured programming object oriented terminology data abstraction , Inheritance , polymorphism.

Unit-II **:** New keywords, type compatibility, scope operator, function in c++, function prototype, In line function, Default argument, Overloading, Operator overloading, Unary operator, Binary operator.

Unit-III **:** Class: definition, Object, Data member and instance variable methods, Implicit object, class scope, Access specifier, Operator method, Constructor, Copy constructor, Destructor, Assignment calls, Static member, Dynamic objects, Array of objects, Friend functions, Pointer to member.

Unit-IV **:** Inheritance and polymorphism**:** simple inheritance, constructor and destructor in inheritance, protected access specifier, class conversions, multiple inheritance, multiple base classes, and virtual base classes.

Unit-V **:** Polymorphism**:** Virtual function, abstract base classes, Using polymorphism with example, Generic function, generic classes.

Unit-VI **:** Stream in c++: Inserter, Extractor, Formatting, Manipulator, Error handling, user defined streams, defining Insertion and extractor operator.

TEXT BOOKS

1) Object oriented Programming with C++, Sahay, Oxford University Press
2) Programming with ANSI C++, Trivedi, Oxford University Press
3) Object Oriented Programming with C++ by E. Balaguruswamy, Tata Mc-Graw Hill publishing Co.Ltd., New Delhi,1995.

REFFERENCE BOOKS:

1) Object Oriented Programming in Turbo C++ by Rober Lofore, Galgotia Publications Pvt.Ltd., New Delhi,1995
2) The C++ Programming Language by Bjame Stroustrup Pub.Co.,New York, 1995 (Addison Wesley)
3) C++ Primer by Lipman Stanley B., New York, Addison Wesely Pub. Company, 1995
4) Data Structure using c and C++ by Langsam, Augenstein and Tenenbaum; PhI, NewDelhi.
5) Joyce Farrell - Object Oriented Programming using C++, Cengage Learning Pub. Company

1AE4 ELECTRIC AND MAGNETIC FIELDS

Unit-I Coordinate systems and Transformations**:** Scalars and vectors, unit vector, vector addition and subtraction, vector multiplication, components of a vector, orthogonal coordinate systems and their transformations, differential length, Area, and Volume, Del operator, Gradient, curl, divergent of a vector.

Unit-II Electrostatic: Coulomb's law and Electric field intensity, Electric flux density, Gauss's law, divergent theorem, Electric vector potential, Electric energy stored in static electric field, potential gradient.

Unit-III Magneto static**:** current density and continuity equation, Biot-Savert's law, stokes theorem, Ampere's circuital law and applications, magnetic flux density, scalar and vector magnetic potential, Energy stored in static magnetic field, Maxwell equations for steady fields.

Unit-IV Maxwell equation and boundary conditions**:** Maxwell equation for time varying fields, Electric boundary conditions for conductor-dielectric interface, magnetic boundary condition for two different magnetic materials.

Unit-V Electromagnetic waves**:** Electromagnetic wave equation in homogeneous medium, wave propagation in a perfect dielectric(free space), solution of electromagnetic wave equation, Intrinsic impedance, Poynting vector and Poynting theorem, Reflection and Refraction of plane waves, Field

analysis of transmission lines, characteristic impedance.

Unit-VI Radiation: Retarded potential, Electric and magnetic fields due to oscillating dipole (Alternating current element), power radiated and radiation resistance, linear arrays, End fire and broad side array, pattern multiplication.

TEXT BOOK:

1. Matthew N.O. Sadiku.: "Elements of Electromagnetic", Oxford University Press(Fourth Edition,2008

2. Jordan E.C. and Balman K.C. : " Electromagnetic Waves and Radiating system" Prentice Hall of India Private Limited, (Second Edition), 1985.

REFFERENCE BOOKS:

1. Hayt W.H.: " Engineering Electromagnetics", Tata Mc-Graw Hill

2. Krauss J.D. : Electromagnetics", Mc-Graw Hill Books co. (Third Edition), 1984

1AE5   COMMUNICATION SKILLS

Unit I   : Comprehension - word study:-

Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage.

Skimming for general ideas, Contextual vocabulary, Error detection, Note making and Location of argument from text, Ability to answer inferential, factual and personal response.

Unit-II Comprehension - Structure study :-

Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms, Use of - not only - but also, if clause, since, may, can, could, would, too etc. Active and passive forms, negative and interrogative, punctuation and capitalization.

Unit III Theoretical background - importance of communication, its process, model of communication its components & barriers. Types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.), important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content.

Unit IV Specific formats for written communication like - business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc. Letter writing,

Preparation of Curriculum – Vitae, Composing messages-telegrams, telex,fax and e-mail Writing memos, agendas and notices of meetings, Preparing advertisements.

Unit-V Oral communications - Important objectives of interpersonal skills, Verbal communication, its significance, face to face communications, group discussion and personal interviews. Voice modulation and logical argument, Comprehension of text at normal reading speed. Listening skill and timely response, Participation and contribution to discussion, Command over language Formal and informal style of communication, Body language.

Unit-VI Non-verbal communication, types of graphics and pictorial devices. Meaning and purpose of meetings, seminars, symposia, conference and workshop. Methodology of conduction of meetings, seminars, symposia, conference and workshop. Brochure preparation for seminars, symposia, conference and workshop. Preparation of minutes of meeting.

TEXT BOOKS :

1) Technical Communication-Principles and Practice, Raman, Oxford University Press

2) Technical Communications-English Skills for Engineers, Raman, Oxford University Press

REFERENCE BOOKS :

1) Curriculum Development Centre, TTTI WR, Bhopal : A Course in Technical English, Somaiya Publication Pvt. Ltd.

2) F.Frank Candlin : General English for Technical Students, University of London Press Ltd

3) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.

4) Chrissie Wright (Editor) : Handbook of Practical Communication Skills, Jaico   Publishing House.

1AE6   ELECTRICAL ENGINEERING & NETWORK ANALYSIS LABORATORY

Minimum 10 experiments based on the syllabus of 1AE1, that are preferably uniformly distributed over the syllabus

1AE7   ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Minimum 10 experiments based on the syllabus of 1AE2, that are preferably uniformly distributed over the syllabus

1AE8 OBJECT ORIENTED PROGRAMMING C++ LABORATORY

Minimum 10 experiments based on the syllabus of 1AE3, that are preferably uniformly distributed over the syllabus

1AE9 COMMUNICATIONS SKILLS LABORATORY

Objective :

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation.

The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Assignments and tests for vocabulary building
2. Technical report writing
3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

Text Book : Norman Lewis : Word Power Made Easy
http://www.teachingenglish.org.uk

1AE101 ENGINEERING MATHEMATICS

Unit I : Linear Algebra: Matrices, Vectors, Determinants, Linear Systems Matrices, Vectors: Addition and Scalar Multiplication, Matrix Multiplication, Linear Systems of Equations. Gauss Elimination, Linear Independence. Rank of a Matrix. Vector Space, Solutions of Linear Systems: Existence, Uniqueness, For Reference: Second- and Third-Order Determinants, Determinants. Cramer's Rule, Inverse of a Matrix. Gauss-Jordan Elimination, Vector Spaces, Inner Product Spaces. Linear Transformations, Linear Algebra: Matrix Eigenvalue Problems, Eigenvalues, Eigenvectors, Some Applications of Eigenvalue Problems, Symmetric, Skew-Symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization. Quadratic Forms, Complex Matrices and Forms.

Unit II : Vector Differential Calculus. Grad, Div, Curl, Vectors in 2-Space and 3-Space, Inner Product (Dot Product), Vector Product (Cross Product), Vector and Scalar Functions and Fields. Derivatives, Curves. Arc Length. Curvature. Torsion, Calculus Review: Functions of Several Variables. Gradient of a Scalar Field. Directional derivative, Divergence of a Vector Field, Curl of a Vector Field, Vector Integral Calculus. Integral Theorems, Line Integrals, Path Independence of Line Integrals, Calculus Review: Double Integrals. Optional, Green's Theorem in the Plane, Surfaces for Surface Integrals, Surface Integrals, Triple Integrals. Divergence Theorem of Gauss, Further Applications of the Divergence Theorem Stokes's Theorem

Unit III : Laplace Transforms, inverse transform, linearity, s-shifting, transforms of derivatives and integrals, ODEs, unit step function, t-shifting, short impulse, Dirac's Delta function, partial fractions, convolution, integral equations, Differentiation and Integration of transforms, Systems of ODEs, Laplace transforms: general formulas, Fourier Series, Integrals, and Transforms

Unit IV : Fourier Series, Functions of Any Period, Even and Odd Functions. Half-Range Expansions, Complex Fourier Series. Forced Oscillations, Approximation by Trigonometric Polynomials, Fourier Integral, Fourier Cosine and Sine Transforms, Fourier Transform. Discrete and Fast Fourier Transforms, Tables of Transforms , Wavelets, wavelets as functions, multi-resolution analysis, Daubechies wavelets and the Cascade algorithm, Properties of Daubechies wavelets, Dilation equation for Daubechies wavelets, Wavelet filters: high pass and low pass filtering, how filters arise from wavelets

Unit V : Numerics in General, Introduction, Solution of Equations by Iteration, Interpolation, Spline Interpolation, Numeric Integration and Differentiation, Linear Systems: Gauss Elimination, LU-Factorization, Matrix Inversion, Solution by Iteration, Ill-Conditioning, Norms Least Squares Method, Matrix Eigenvalue Problems: Introduction, Inclusion of Matrix Eigenvalues, Power Method for Eigenvalues, Tridiagonalization and QR-Factorization

Unit VI : Data Analysis. Probability Theory, Data Representation. Average. Spread, Experiments, Outcomes, Events, Probability, Permutations and Combinations, Random Variables. Probability Distributions, Mean and Variance of a Distribution, Binomial, Poisson, and Hypergeometric Distributions, Normal Distribution, Distributions of Several

Random Variables, Mathematical Statistics, introduction to random sampling, point estimation of parameters, confidence intervals, testing hypotheses, Decisions, Quality Control, Acceptance Sampling, Goodness of fit test, Nonparametric tests, regression, fitting straight lines, correlation

Textbook : Advanced Engineering Mathematics, 9th Edition, Ervin Kreyszig, John Wiley & Sons Inc, 2006

Reference Book: Advanced Engineering Mathematics, 3rd Edition, Merle C. Potter, J. L. Goldberg and Edward F. Aboufadel, Oxford University Press, 2005

1AE102   **EMBEDDED C**

UNIT I : Programming embedded systems in C

Introduction What is an embedded system Which processor should you use Which programming language should you use Which operating system should you use How do you develop embedded software Introducing the 8051 microcontroller family Introduction What's in a name The external interface of the Standard 8051 Reset requirements Clock frequency and performance Memory issues I/O pins Timers Interrupts Serial interface Power consumption Introduction Installing the Keil software and loading the project Configuring the simulator Building the target Running the simulation Dissecting the program Building the hardware

UNIT II : Reading switches

Introduction Basic techniques for reading from port pins Example: Reading and writing bytes Example: Reading and writing bits (simple version) Example: Reading and writing bits (generic version) The need for pull-up resistors Dealing with switch bounce Example: Reading switch inputs (basic code)Example: Counting goats Adding structure to your code Introduction Object-oriented programming with C The Project Header (MAINH)The Port Header (PORTH) Example: Restructuring the 'Hello Embedded World' example: Restructuring the goat-counting example Further examples

UNIT III : Meeting real-time constraints

Introduction Creating 'hardware delays' using Timer 0 and Timer 1 Example: Generating a precise 50 ms delay Example: Creating a portable hardware delay Why not use Timer 2The need for 'timeout' mechanisms Creating loop timeouts Example: Testing loop timeouts Example: A more reliable switch interface Creating hardware timeouts Example: Testing a hardware timeout Conclusions

UNIT IV : Creating an embedded operating system

Introduction The basis of a simple embedded OS Introducing sEOS Using Timer 0 or Timer 1Is this approach portable Alternative system architectures Important design considerations when using sEOS Example: Milk pasteurization

UNIT V : Multi-state systems and function sequences

Introduction Implementing a Multi-State (Timed) system Example: Traffic light sequencing Example: Animatronic dinosaur Implementing a Multi-State Input/Timed) system Example: Controller for a washing machine

UNIT VI : Using the serial interface

Introduction What is RS-232Does RS-232 still matter The basic RS-232 protocol Asynchronous data transmission and baud rates Flow control The software architecture Using the on-chip UART for RS-232 communications Memory requirements Example: Displaying elapsed time on a PC The Serial-Menu architecture Example: Data acquisition Example: Remote-control robot Case study: Intruder alarm system Introduction The software architecture Key software components used in this example Running the program

Text Book:

1) Embedded C, Michael J Pont ,Pearson Education Limited 2002

Reference Book :

1) Barnett, O'Cull & Cox- Embeded "C" Programming and Atmel AVR, Cengage Learning Pub. Company.

1AE103   **COMPUTER ORGANIZATION AND ARCHITECTURE**

UNIT I : Organization and architecture, structure and function, Computer evolution and performance: Brief history of computer, designing for performance , computer components, computer function , bus interconnection, PCI

UNIT II : External devices, I/O modules, I/O Channels and lOPs, SCSI and firewire interfaces, operating system overview, memory management, swapping, partitioning , paging , virtual memory.

UNIT III : ALU: Machine instruction characteristics , operand types, operation types, Addressing modes, instruction formats, CPU structure, processor organization register organization, instruction cycle, instruction pipelining.

UNIT IV : RISC machine, instruction execution characteristics, register file concept, compiler based register optimization , RISC architecture, RISC pipelining, RISC vs CISC, case study of power PC 620.

UNIT V : Control unit operation: Micro operation, control of processor.

Hardwired implementation, micro program control : Concepts, microinstructions sequencing and execution, application of microprogramming.

UNIT VI : Multiple processor organizations, symmetric multiprocessors, Mainframe SMP, Cache coherence and MESI protocol , clusters . Non uniform memory access. Vector computation

Text books:

1) William Stalling" Computer organization and architecture". 6/e (Pearson education)
2) Parhami, Computer Architecture, Oxford University Press
3) Alan Clements, Principles of Computer Hardware, 4/e, Oxford University Press
4) A.S. Tanenbaum" Structured computer organization" 4/e McGraw Hill (ISE)

Reference Books:

1) C. Hamecher, R. Zaky Computer Organization. 5/e McGraw Hill (ISE)
2) J.P. Hayes Computer architecture and organization. 4/e McGraw Hill (ISE)
3) M. Mano & Kime Logic & Computer design fundamentals, 2/e (Pearson education)

1AE104   FUNDAMENTALS OF VLSI TECHNOLOGY

UNIT I   Structure and properties of Si, Ge and GaAs. Preparation,purification by zone refining and single crystal growth by CZ method for Si, Ge and GaAs.Cutting of crystal, cementing of slices and ingots, lapping   and polishing.

UNIT II   Epitaxy: types, epitaxial evaluation, Oxidation, Lithography

UNIT III   Reactive plasma Etching, Dielectric and polysilicon film deposition,

UNIT IV   Diffusion, ion implantation, metallization

UNIT V   VLSI Process integration: IC processing, NMOS, CMOS, MOS Memory, Bipolar IC Technology, IC fabrication, Analytical Techniques

UNIT VI   Basics of Assembly Techniques and packaging of VLSI Devices, Yield and Reliability.

Text Book:

1) S.M. Sze. : VLSI technology, Tata McGraw-Hill

Reference Books:

1) S.K.Gandhi : VLSI Fabrication principles, 'Silicon and Gallium Arsenide'
2) Dr.A.A.Ghatol : Semiconductor Devices Technology.

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SEMESTER : SECOND

2AE1   LINEAR INTEGRATED CIRCUITS

Unit I   :   Operational Amplifier:
Differential amplifier: gain expression using H parameters, transfer-characteristics, constant current source, level shifting, block diagram of op-amp, frequency response, frequency compensation methods, study of IC   , measurement of parameters of op-amp, off set nulling and their importance.

Unit II   :   Linear Applications of Op-amp
Inverting and non inverting amplifiers, voltage followers (AC-DC), integrator, differentiator, Differential amplifier, bridge amplifier, Instrumentation amplifiers, precision rectifier, RMS to DC converter, voltage to current converter, sinusoidal RC oscillators, constant voltage sources, frequency to voltage and voltage to frequency converter.

Unit III   :   Non-Linear Applications of Op-Amp and Filter Circuits
Clipping and clamping circuits, comparator, astable, monostable and bistable multivibrator, Schmitt Trigger, voltage sweep generator, active filters: Butterworth, Chebyshev filters using op-amp,

Unit IV   :   Voltage Regulator
Transistorized series and shunt voltage regulators, Block schematic of regulator IC 723, regulated power supply using IC 723, short circuit protection, switch mode power supply, dual tracking regulators, regulator using 78xx, 79xx, and LM 317.

Unit V   :   Timers:
Block schematic of regulator IC 555, application of timer 555 as astable, monostable and bistable multivibrator, Delayed timer, sawtooth generators, function generator using 8038, Sample & Hold circuit

Unit VI   :   Phase Locked Loops
Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC-LM 565 and its application as AM detector, FM detector and Frequency translator.

Text Books:

1) Gayakwad R.A. : Op-Amps and Linear Integrated Circuits, Prentice Hall of India Pvt. Ltd., New Delhi (2nd edition)

2) Robert F. Coughlin : Operational Amplifiers & Linear Integrated Circuits, and F.F.Driscoll Pearson Education

Reference Book: Sedra/Smith : Microelectronics Circuits, 5e, Oxford University Press

2AE2 COMMUNICATION ENGINEERING

Unit I : Signal and Noise

Audio signals, frequency range for speech and music, sound intensity, loudness, loudness level, frequency response, band width, bandwidth requirement for different types of signals such as telegraph, telephone, speech, music, video. External noise -Atmospheric, Extraterrestrial, Industrial, Internal noise- Thermal agitation, shot, Transit-time, miscellaneous noise, addition of noise due to several sources and several amplifiers in cascade, definition of noise figure, calculation of noise figure, noise figure from equivalent noise resistance, noise figure from measurement, noise temperature.

Unit II : Wave Propagation

Electromagnetic waves, sky waves, ground waves, space waves, ionosphere, critical frequency, maximum usable frequency, virtual height, fading, duct propagation and skip distance.

Unit III : Antenna

Principle of radiation, isotropic radiator, resonant antenna, non resonant antenna, , Half wave dipole antenna, folded dipole, parasitic reflector, parasitic director, antenna arrays, Yagi-Uda antenna, antenna power gain, Beam width, Polarization, radiation resistance.

Unit IV : AM transmitters

Communication systems, modulation, need for modulation, AM modulation, Frequency Spectrum, Principles of DSB-FC, DSB-SC, SSB-SC, modulation and their Comparison, Generation of DSB-SC by using Balanced modulators (FET & Diodes), DSB-SC Transmitter. Generation of SSB-SC by phase shift method.

Unit V : AM receivers

TRF Receivers, Super heterodyne receiver, RF Amplifier, Oscillator, IF Amplifier, Diode detector.

Mixer: Principle, Need and Types of AGC, Characteristics such as selectivity, sensitivity, fidelity, Communication Receiver.

Unit VI : FM transmitter

FM Modulation, Frequency Spectrum, pre–emphasis. and De-emphasis , Narrow Band and Wide Band FM, direct FM Generation using FET and varactor diode, indirect FM generation.

FM receivers

FM receiver, amplitude Limiter, Balanced slope detector, Analysis of Foster Seeley Discriminator, ratio detectors.

Text Book:

1) Kennedy G. : Electronic communication system (Mc-Graw Hill) 4th Ed

2) Lathi B.P.: Modern digital & analog Communication Systems, 3rd Ed. Oxford \ University press.

Reference Book:

1) Dennis Roddy & John Coolen : Electronic communication (PHI) 4th Ed

2AE3 DIGITAL INTEGRATED CIRCUITS

Unit I : Number systems, Gray codes, Arithmetic operations, 2's complements, floating point arithmetic and its representation, Logic gates, Boolean algebra, standard form of logical function, K-map up to five variables, Quine Mc-Clusky method, Don't care conditions and their effects, Synthesis using AND- OR gates

Unit II : Study and analysis of digital logic families: TTL, ECL, MOS, CMOS and their characteristics, Tri-state logic, TTL and CMOS IC series , Latches, Flip-Flops R-S, J-K, Master slave J-K, D-type, T-type, registers and counters, Adders and subtractors using logic gates.

Unit III : Combinational Logic Design using 74/54 MSI chip series concerning to multiplexers, De-multiplexers, decoders, encoders, comparators, code converters, priority encoders, parity generator/ checker & BCD-to-seven segment decoder.

Unit IV : Combinational Logic Design using ROM array, PLA, PAL, Preliminary design concepts using FPGAs, N-bit binary adder using 7480. carry Look ahead adder construction.

Unit V : Types of semiconductor memories, sequential memories, 2 and 4 phase ratio-less shift registers, CMOS registers stages, static shift registers, implementation of ROM (ROM, PROM, EPROM, EEPROM) BJT RAM cell, MOS-RAM, CCD memories.

Unit VI : Design of sequential networks: Analysis of clocked sequential networks, General models of sequential machines,

Equivalence and minimization networks, Deviation or state graph and tables, reduction of state assignments, S.M. chart.

Text Books:

1) M. Mano. : Digital Design 3rd ed (Pearson Education)
2). R.P.Jain : Modern Digital Electronics 3rd ed (TMH)
3) Ken Martin : Digital Integrated Circuit Design, Oxford University Press

Reference Book:

1) Sedra/Smith : Microelectronics Circuits, 5e, Oxford University Press

2AE4   MICROPROCESSOR AND MICROCONTROLLER

Unit I   :   An introduction to 8085: Address decoding technique, 8085 architecture, Register structure,, memory addressing and addressing modes. Instruction set of 8085 microprocessor time diagrams, ALP using data transfer, arithmetic, logic, branch instruction, stack subroutines, Interrupt system of 8085.

Unit II   :   Architecture, modes, and programming of PPI 8255, DMA data transfer concepts. DMA controller 8257: Internal architecture, interfacing of 8237 with 8085 & Programming. USART8251 Internal architecture, interfacing with 8085, Interfacing standards of RS-232C and IEEE 488 GPIB. (9 Periods)

Unit III   :   Analog to digital and digital to analog conversion techniques and its interfacing with 8085: Case study of ADC0809 and ADC1210, Case study of DAC 0808 and DAC 1008. Applications of ADC for measurement of temp., weight and light. Application of DAC for generating different waveforms. (10 Periods)

Unit IV   :   An introduction to 8051 : Overview of the 8051 family, Architecture of 8051, Signal description of 8051, Internal Memory, Internal RAM, External Memory, Register structure, stack and stack pointer, SFR, I/O port structure, Timer structure and their modes. serial data input and output, serial data transmission and reception.   (10 Periods)

Unit V   :   Instruction set of 8051, Addressing modes of 8051, Data moves, PUSH, POP, and Data exchange instruction, Logical bit and Byte level operation, Arithmetic operation ,Jump and Call instruction, time delay generation and calculation , Interrupts and returns , programming using 8051, Timer / counter programming, serial communication programming & Interrupt programming.   (10 Periods)

Unit VI   :   8051 interfacing to external memory, Interfacing of Analog to digital converter, Digital to Analog converter, LCD & stepper motor with 8051, Interfacing of seven segment display to 8051 and programming .Interfacing of keyboard to 8051.

TEXTBOOKS:

1) Han-Way Huang, Using the MCS-51 Microcontroller, Oxford University Press
2) K.J.Ayala: "The 8051 Microcontroller", Penram Int. Pubs., 1996
3) Mazidi & Mazidi: "8051 Micro-controller & Embedded System",Pearson Edu., 2 Edition.
4) Rajkamal: Arch. Prog. Interfacing & system design. Pearson Edu.

REFERENCE BOOKS :

1) A. K. Ray and K. M. Burchandi : Advanced Microprocessor and Peripherals, Architecture Programming and Interfacing, Tata McGraw Hill Publishing Co. Ltd., New Delhi (TMH)

2AE51   JAVA

Unit I   :   Introduction to Java
                     Importance and features of Java, Concepts of Java Virtual machine (JVM) Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes

Unit II   :   Inheritance
                     Basic types, super classes, Multilevel hierarchy abstract and final classes, object class, Packages and interfaces, Access protection, extending Interfaces, Exception handling, Fundamental exception types, uncaught exception, throw, throws, final methods, creating own exceptions

Unit III   :   Multithreaded programming
                     Review of fundamentals, Java thread model, synchronization, messaging, thread class, Run able interface, inter thread communication, Monitors, Deadlock, Producer/ Consumer problems, Wait() and notify(), Performance issues

Unit IV   :   Input/Output
                     Basics, Streams, Byte and Character Streams, predefined streams, reading and writing from console and files, using Java packages Networking in Java Networking fundamentals,

Client/server model, Internet addresses, Sockets, networking classes and interfaces, using Javanet package, TCP/IP and data gram programming, HTTP protocol and URLs

Unit V : Event Handling

Different mechanism, the delegation event model, classes, Event Listener Interfaces, Adapter and Inner classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video Java Applet

Unit VI : Programming Graphical System:

Reading and writing images, Image manipulation, Printing graphics, Print Services, Stream print service, Classes and interfaces for Data transfer, Building transferable image transferring java objects via system clipboard

Text Book:

1. "Java –2 The Complete Reference" Patrick Naughton and Herbertz Schidt, 2nd Ed

References:

1 "Programming with Java" E Balaguruswamy, Second edition, TMH
2 "HTML 4 Unleashed" Rick Dranell, Second edition, Tec media publication
3 "Dynamic web publishing Unleashed" Shelley Powers, Second edition, Tec media
4 Cay S Horstmann and Gary Cornell, Java 2 Vol I and II-Sun Micro Systems-2001

2AE52   **PCB DESIGN USING ORCAD**

Unit I : INTRODUCTION TO PCB DESIGN AND CAD

Computer-Aided Design and the OrCAD Design Suite, Printed Circuit Board Fabrication, PCB cores and layer stack-up, PCB fabrication process, Photolithography and chemical etching, Mechanical milling, Layer registration, Function of OrCAD Layout in the PCB Design Process, Design Files Created by Layout, Layout format files (MAX), Postprocess (Gerber) files, PCB assembly layers and files

Unit II : INTRODUCTION TO THE PCB DESIGN FLOW BY EXAMPLE

Overview of the Design Flow, Creating a Circuit Design with Capture, Starting a new project, Placing parts, Wiring (connecting) the parts, Creating the Layout netlist in Capture, Designing the PCB with Layout, Starting Layout and importing the netlist, Mking a board outline, Placing the parts,

Autorouting the board, Manual routing, Cleanup, Locking traces, Performing a design rule check, Postprocessing the board design for manufacturing

Unit III : PROJECT STRUCTURES AND THE LAYOUT TOOL SET

Project Setup and Schematic Entry Details, Capture projects explained, Capture part libraries explained, Understanding the Layout Environment and Tool Se, Board technology files, The AutoECO utility, The session frame and Design window, The toolbar, Controlling the autorouter, Postprocessing and layer details

Unit IV : MAKING AND EDITING CAPTURE PARTS

The Capture Part Libraries, Types of Packaging, Homogeneous parts, Heterogeneous parts, Pins, Part Editing Tools, The Select tool and settings, The pin tools, The graphics tools, The zoom tools, Constructing Capture Parts, Method 1: Constructing Parts Using the New Part Option (Design Menu), Design example for a passive, homogeneous part, Design example for an active, multipart, homogeneous component, Assigning power pin visibility, Design example for a passive, heterogeneous part

Unit V : MAKING AND EDITING LAYOUT FOOTPRINTS

Introduction to the Library Manager, Introduction to Layout's Footprint Libraries and Naming Conventions, Layout's footprint libraries, Naming conventions, The Composition of Footprints, Padstacks, Obstacles, Text, Datums and insertion origins, The Basic Footprint Design Process, Working with Padstacks, Accessing existing padstacks, Editing padstack properties from the spreadsheet, Saving footprints and padstacks, Footprint Design Examples, Design example 1: a surface-mount footprint design, Design example 2: a modified through-hole footprint design,

Unit VI : PCB DESIGN EXAMPLES

Overview of the Design Flow, Example 1: Dual Power Supply, Analog Design, Initial design concept and preparation, Project setup and design in Capture, Defining the board requirements, Importing the design into Layout, Setting up the board, Prerouting the board, Autorouting the board, Finalizing the design, connections to digital and analog parts , Connecting separate analog and digital grounds to a split plane, Using busses for digital nets,

Text Book :

1 Complete PCB Design Using OrCAD Capture and Layout *By Kraig Mitzner, Elsevier Inc, 2007*

2AE53   CONTROL SYSTEMS

Unit I : Basic definitions, Closed and open loop systems, transfer functions, block diagrams, Derivation of transfer functions (only electrical systems), signal flow graphs, basic control action.

Unit II : Time response Analysis, Impulse response function, Analysis of first, second and higher order system, stability of control system, Routh Hurwitz's stability criterion, static and dynamic errors coefficients, error criteria

Unit III : Root locus method, introduction, root locus plots, rules for constructing root loci, Root locus analysis of control systems, effect of zeros, derivative control and velocity feed back.

Unit IV : Frequency response, Bode Plots, Determination of static Position, Velocity and acceleration error coefficients. Polar plots, Nyquist stability criterion, stability analysis, relative stability.

Unit V : State space representation of systems, solutions of state equations, transition matrix, diagonalisation, controllability and observability.

Unit VI : Sampled data control system; Introduction, difference equations, Z-transform and properties, Inverse Z-transforms. Analysis of sampler and Zero-order hold, transfer function of sampled data systems (Block diagrams)

TEXT BOOKS:
1) I.J. Nagrath & M. Gopal (3/e) : Control systems Engineering (WEL)
2) Stefani, Shahian, Savant, Hostetter : Design of Feedback Control Systems, 4e, Oxford University Press
3) B.C. Kuo (7/e):Automatic Control Systems (PHI)
4) Ogata : Modern Control Engineering (PHI)

2AE54   BLUETOOTH APPLICATION PROGRAMMING WITH JAVA APIS

Unit I : **Introduction Bluetooth Wireless Technology**
Introduction, Wireless Connectivity What Is Bluetooth Wireless Technology, History of Bluetooth Wireless Technology Bluetooth Vision, Bluetooth Specification Overview of Bluetooth Stack Architecture, Bluetooth Protocols Bluetooth Profiles Bluetooth Qualification What Is JAVA ME Configurations Profiles Optional Packages Why JAVA Technology for Bluetooth Devices? Java Community Process SM (JCP) and JSR-82What about Java SE?

Unit II : **An Overview of JABWT**
Goals Target Devices Keeping up with the Bluetooth Profiles JABWT Use Cases
API Characteristics and Hardware Requirements JABWT Specification characteristics
Java ME Device Requirements Bluetooth System Scope

Unit III : **High-Level Architecture**
Architecture of JABWT CLDC, MIDP, and JABWT Java Packages Client and Server Model Device Properties Bluetooth Control Center Conflict Resolution Modifying Device Properties User Interaction BCC on Devices with No User Interface Simple JABWT Application Development Sample Application

Unit IV : **RFCOMM**
Overview API Capabilities Programming with the API Establishing a Server Connection Establishing a Client Connection

Unit V : **OBEX**
Overview Use Cases Protocol Description Example Session API Programming with the API Establishing a Connection Manipulating OBEX Headers Sending a Request to the Server Receiving a Request from a Client Using OBEX Authentication

Unit VI : **Device Discovery Overview**
API Capabilities Programming with the API Accessing the Local Device Discovery via Inquiry Retrieving Information from a Remote Device Using the Device Class

Text Book : BLUETOOTH_ APPLICATION PROGRAMMING WITH THE JAVA APIs ESSENTIALS EDITION ,TIMOTHY J THOMPSON PAUL J KLINE, Elsevier 2008

2AE6   INTEGRATED CIRCUITS LABORATORY
Minimum 10 experiments based on the syllabi of 2AE1: Linear Integrated Circuits and 2AE3: Digital Integrated Circuits, that are preferably uniformly distributed over the syllabi.

2AE7   PROFESSIONAL ELECTIVE LABORATORY
Minimum 10 experiments each based on the syllabus of subjects included in 2AE5x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

2AE51   **Java**
2AE52   **PCB Design using OrCAD**
2AE53   **Control Systems**
2AE54   **Bluetooth Application Programming with Java APIs**

Text Book : JOHN G. PROAKIS-CONTEMPORARY COMMUNICATION SYSTEMS USING MATLAB, 2ND ED,

2AE8   MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Minimum 10 experiments based on the syllabus of 2AE4, that are preferably uniformly distributed over the syllabus.

2AE9   BASIC ELECTRONICS WORKSHOP

Minimum 10 Experiments will be based on the following.

1. Understanding transformers, Calculation of value of Resistor/ Capacitor from its colour/bar code, Identification of Electronic passive components Resistors, Capacitors, inductors- types. Testing of these devices

2. Identification and Testing of devices - diode, zener diode, Tunnel diode, LED, Silicon Controlled Rectifier, bipolar junction transistor, FET, MOSFET, etc.

3. Switches and relays- types, specifications, applications and testing.

4. Fuses, Cables and connectors - types, construction, specifications, testing and   applications.

5. PCB layout design using any standard software package (ORCAD/ PROTEL)

2AE101   POWER ELECTRONICS

Unit I   : SCR, Triac, Diac-construction, characteristics & applications, two transistor analogy for turning ON-OFF SCR, turn ON mechanism, different methods of turning ON-OFF SCR, turn OFF mechanism, Thyristor firing circuits. Introduction to GTO, power transistor, power MOSFET & IGBT & their construction & characteristics.

Unit II   : Series parallel operation of SCR's, static & dynamic equalizing circuits., equalization of current in parallel connected SCR's, string efficiency, derating factor, Protection of SCR's against di/dt, dv/dt, radio freq., interference, over voltage, over current.

Unit III   : Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load derivation for output voltage and current, effect of free wheeling diode, single phase dual converters.

Three phase half controlled bridge and fully controlled bridge rectifier. (only descriptive approach)

Unit-IV   : Classification of circuits for forced commutation, series inverter, improved series inverter, parallel inverter, out put voltage and waveform control, principle of operation for three phase bridge inverter in 120 degrees and 180 degrees Mode, PWM Techniques, (sinusoidal PWM techniques, hysteresis control PWM)

Unit-V   : Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper circuits, Jones chopper, step-up chopper and AC chopper. Basic principle of cyclo converters, single phase to single phase cyclo converter.

Unit-VI   : Speed control of DC series motors using chopper, speed control of DC shunt motor using phase controlled rectifiers, speed control of three phase induction motor by stator voltage control, v/f control and slip power recovery scheme. Static circuits breaker, UPS, fan speed regulator, Application of HVDC transmission

TEXT BOOKS :
1. Moorthi, Power Electronics, Oxford University Press
2. Krein, Elements Of Power Electronics, Oxford University Press

REFERENCES:
1) M . Ramamoorthy - Thyristor and their application.
2) M.H.Rashid - Power Electronics Circuits., Devices and Application.
3) G. K. Dubey, S.R.Doradia, A.Joshi, R.M.K. Sinha - Thyristorised Power controller.
4) M.D.Singh & K.B.Khanchandani - Power Electronics, Tata Mc Graw Hill.
5) Bimal K. Bose, - Modem Power Electronics & AC drive: Pearson Education

2AE102   INTRODUCTION TO MATLAB

UNIT I   : **Matrices and Matrix Operations**
Referencing individual entries Matrix operators Matrix division (slash and backslash) Entry-wise operators Relational operators Complex numbers Strings other data types Sub-matrices and Colon Notation Generating vectors Accessing sub-matrices

UNIT II   : **MATLAB Functions**
Constructing matrices Scalar functions Vector functions and data analysis Matrix functions The linsolve function The find function Control Flow Statements The for loop The

while loop The if statement The switch statement The try/ catch statement Matrix expressions (if and while) Infinite loops

UNIT III : M-files

M-file Editor/Debugger window Script files Function files Multiple inputs and outputs Variable arguments Comments and documentation MATLAB's path Advanced M-file Features Function handles and anonymous functions Name resolution Error and warning messages User input Performance measures Efficient code

UNIT IV : Calling from MATLAB

Calling C from MATLAB : A simple example C versus MATLAB arrays A matrix computation in C MATLAB mx and mex routines Online help for MEX routines Calling Fortran from MATLAB: Solving a transposed system A Fortran mexFunction with %val Calling Java from MATLAB: A simple example Encryption/decryption MATLAB's Java class path Calling your own Java methods Loading a URL as a matrix

UNIT V : Two and Three Dimensional Graphics

Planar plots Multiple figures Graph of a function Parametrically defined curves Titles, labels, text in a graph Control of axes and scaling Multiple plots Line types, marker types, colors Subplots and specialized plots Graphics hard copy Three-Dimensional Graphics Curve plots Mesh and surface plots Parametrically defined surfaces Volume and vector visualization Color shading and color profile Perspective of view Advanced Graphics Handle Graphics, introduction to Graphical user interface Images

UNIT VI : Advanced Topics

Sparse Matrix Computations Storage modes Generating sparse matrices Computation with sparse matrices Ordering methods Visualizing matrices Calculus Variable precision arithmetic Numeric and symbolic substitution Algebraic simplification Two-dimensional graphs Three-dimensional surface graphs Three-dimensional curves Symbolic matrix operations Symbolic linear algebraic functions Solving algebraic equations Solving differential equations

TEXT BOOK:

1   Getting Started with MATLAB 7, Rudra Pratap, Oxford University Press

2.   MATLAB Primer Seventh Edition, BY Timothy A Davis Kermit Sigmon

2AE103   FUNDAMENTALS OF INSTRUMENTATION AND MEASUREMENT

Unit I : Measurement Instrumentation

General introduction and definitions, Measurement-Instrumentation-Metrology, Instrument modeling, Model of a measurement instrument, Dynamic characteristics ,Instrument performance , Implementing measurement acquisition, Principles and methodology of measurement , Analyzing measurements obtained by an instrument, Base definitions, Electronic instrumentation, Electronic instrumentation functionality ,The role of instrumentation in quality control.

Unit II : General Principles of Sensors

Basic definitions, Metrological characteristics of sensors, Systematic errors, analyzing random errors and uncertainties, Standard deviations. , Variances, Decisions about random uncertainties. Reliability, accuracy, precision Sensor calibration. Simple calibration, Linking international measurement systems, Band pass and response time, Harmonic response, Passive sensor conditioners, Conditioners for active sensors, Direct   reading, Using operational amplifiers

Unit III : Physical Principles of Optical, Thermal and Mechanical Sensors

Optical sensors, Luminous flux ,The relative luminous efficiency curve of the human eye, The black body: a reference for optical sensors, Black body radiation, Darkness currents, Spectral and total sensitivities, Sources of fundamental noise sources in optical sensors, Photoconductor cells , Principle of photodiode, fabrication, Photodiode equation, Force and deformation sensors, Resistive gauges, Piezoelectric effect,. Piezoelectricity and pyroelectricity, Construction of piezoelectric sensors, Thermal sensors, Concepts related to temperature and thermometry, Contact temperature measurement of solids, Resistive thermometers.

Unit IV : Real-time Data Acquisition and Processing Systems

Electronic devices for signal sampling and quantification, Nyquist sampling, Quantification noise, Over-sampling and reconstruction, Under-sampling, Analog-to-digital converters, Real-time digital analysis by a specialized processor, Fixed point and floating point analysis, General structure of a DSP, Multiplication/accumulation structure, Using standard filtering Algorithms. General structure of a real-time filtering program, The FIR filter and simple Convolutions, IIR filters.

Unit V : **Instruments and Measurement Chains**

Measurement devices : Intensity measurements, Oscilloscopes, Spectrum analyzers, Sweeping analyzers, FFT analyzers, Network analyzers, Impedance analyzers, Measurement with a network analyzer, The parallel bus IEEE488 Serial buses, Description of PC buses External acquisition cards: the VXI system, Functions of the VXI bus, Description of the VXI bus

Unit VI : **Intelligent Sensors**

Architecture of an intelligent system. Processing and performances. Improving performances with sensors, Reliability and availability of information, intelligent distance sensors in cars, Field bus networks, Towards a system approach

Text Book:

Dominique Placko ,"Fundamentals of Instrumentation and Measurement", ISTE Ltd, 2007

2AE104   **COMPUTER NETWORKS**

Unit I : Introduction

Uses of computer networks, Network Architectures, The OSI Reference model, TCP/IP reference model, Network examples, Data communication network examples.

Unit II : The Medium Access Control Sublayer, The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, Data Link Layer Switching

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Unit III : The Network Layer

Network layer design issues, Routing Algorithm, Congestion control algorithm, internetworking, the network layer in the internet

Unit IV : The transport layer: Services provided to the session layer, Quality of service, Transport service primitives, transport protocol, elements of transport protocols, the internet transport protocols, UDP, TCP, performance issues

Unit V : Application layer: Application Layer design issues, DNS, e-mail, www, multimedia

Unit VI : Network security, cryptography, symmetric key algorithms, public key algorithms, digital signatures, management of public keys, communication security, authentication protocols, e-mail security, web security

Text Book:

1)   Andrew S. Tanenbaum : Computer Networks, 4 e, Pearson Education/ Prentice Hall

THIRD SEMESTER

3AE1   **DIGITAL COMMUNICATIONS**

Unit I : DIGITAL COMMUNICATION SYSTEM

Elements of digital communication System, advantages of digital communication System, source encoder, decoder, Channel encoder, decoder, modulator, demodulator, clock synchronization and carrier synchronization.

Unit II : PROBABILITY, INFORMATION THEORY and COMMUNICATION CHANNEL

Definitions, Probability of random events, Laws of probability, joint & conditional probability, relationships involving joint, marginal & conditional probabilities, Baye's rule, statistical independence, Binary communication channel, discrete communication channel, information content, rate of information, joint entropy & conditional entropy,

Source Encoding, Shannon's Encoding algorithm, Huffman encoding algorithm, Shannon's theorem on channel capacity.

Unit III : DIGITAL MODULATION AND TECHNIQUES

Digital carrier modulation Schemes, Binary ASK, PSK, FSK coherent schemes, bandwidth consideration and probability of errors(only theoretical concept), comparison of digital modulation systems, Basics of DPSK, QPSK, MSK.

Unit IV : ERROR CONTROLLING AND CODING

Introduction to error controlling and coding, Methods of controlling errors, type of errors and codes, linear block codes, Matrix description of linear block code, error detection and error correction capabilities of linear block code.

Unit V : BASE BAND TRANSMISSION

Base band PAM system, inter symbol interference, Nyquist criterion, pulse shaping, equalization, eye diagram, scrambler and unscrambler, Duo binary signaling scheme.

Unit VI : MODERN TECHNIQUES OF COMMUNICATION

Multiple access schemes: TDMA, FDMA, CDMA, spread spectrum communication, D.S. spread spectrum, frequency hopping spread spectrum, comparison.

Text Books:

1)   Shanmugam K.S. Digital & analog Communication Systems, John Willey & Sons, New York

2)   Lathi B. P. Modern Digital and Communication Systems Oxford University Press

Reference books:

1) Simon Haykin Digital Communication John willey & sons
2) J.G. Proakis Digital Communication MGH 4TH ED
3) Taub,Herbert, Principles of Communication Systems, Mc-Graw Hill International Schilling D.L. Book Co., Tokiyo.
4) Glover and Grant Digital Communication, Prentice Hall Publication.

3AE2   DIGITAL SIGNAL PROCESSING

Unit I   :   Introduction to DSP, Frequency domain description of signals & systems, Discrete time sequences systems, Linearity, unit sample response, Convolution, Time invariant system, Stability criteria for discrete time systems, Solution of linear difference equations.

Unit II :   Introduction to Fourier transform of Discrete Time Signal and its properties, Inverse Fourier transform, Sampling of continuous time signal, Reconstruction of continuous time signal from sequences, Z-Transform and its properties, complex Z-plane, ROC, Determination of filter coefficients, relationship between Fourier transform and Z-Transform, Inverse Z-Transform.

Unit III: DFT and its properties, Circular convolution, linear convolution from DFT, FFT, and Decimation in time and frequency algorithm, and Introduction to wavelet transform.

Unit IV: Filter categories, Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter, Frequency sampling structures for F.I.R. filter, Steps in Filter Design, Design by pole zero placements, FIR filter design by Windowing method, Rectangular, Triangular and Blackman window

Unit V: Analog filter types: Butterworth, Elliptic and Chebyshef filter, Filter Specifications, formulae, filter order, Methods to convert analog filter into digital filters, Mapping of differential, impulse invariant, Bilinear, Matched Z transformation.

Unit VI: Multi rate DSP, Introductory concept of multi rate signal processing, Design of practical sampler, Rate converters, Decimators and Interpolator, Filter bank application and examples

Text books:

1. Proakis and Manolakis:Digital Signal Processing, 3/e, Pearson Education
2. S. Salivahan, A. Vallavaraj: Digital Signal Processing (TMH)

Reference Book:

B. P. Lathi: Signal Processing and Linear Systems, Oxford University Press

3AE3   VLSI DESIGN

Unit I :   Digital Design Fundamentals: Review of techniques of using a truth table, canonical forms to develop the AND/OR or OR/AND   combinational circuit models, minimization techniques, Hazards and Hazard free circuits. Difference between combinational and sequential circuits. General model of sequential machine, timing and triggering considerations.

Unit II :   Basic HDL Constructs: VLSI Design flow, Overview of different modeling styles in VHDL, Data types and data objects in VHDL, Dataflow Modeling, Behavioral Modeling, using VHDL for combinational Circuits and sequential Circuits.

Unit III :   Hardware Description Language: Structural Modeling, Subprograms, Packages and Libraries, Generics, Configurations, attributes. Comparison of various Hardware Description Languages.

Unit IV :   Programmable Logic Devices: Introduction to CPLDs: Function block architecture, input/output block, switch matrix, Study of architecture of CPLDs of Altera /Xilinx. Introduction to FPGAs: Configurable logic block, input/output block and interconnect, Study of architecture of FPGAs of Xilinx /Actel /Altera.

Unit V: CMOS Circuits: Different logic families, MOS Transistor, CMOS as an inverter, propagation delay, power consumption/ dissipation issues, simple circuits using CMOS.

Unit VI: CMOS Processing & Digital Circuit Verification: CMOS Fabrication: Different steps of fabrication, CMOS p-well, n-Well   and twin tub processes, CMOS Layout and Design rules. Simple Test Bench, Simulation and Synthesis issues, case study of ALU/ Sequence Detector.

Text Books:

1) Neil H.Weste and Kamran Eshraghin, "Principles of CMOS VLSI design".
2) J Bhasker," VHDL Primer". Addison Wesley
3) Douglas Perry," VHDL" TaTa McGraw HILL
4) William I. Fletcher "An Engineering approach to Digital Design", Prentice Hall India.
5) Digital Integrated Circuit Design, K. Martin, Oxford University Press

Reference Books:

1) Stephen Brown and Zvonko Vranesic, "*Fundamentals* of Digital Logic with VHDL
2) Design". Tata McGRAW HILL

3) Wayne Wolf: "VLSI Technology"

3) Allen & Homberg : "CMOS design"

4) Basics of CMOS cell design by Sicord & Bhendiya

5) John Yarbrough, BROOKS /COLE, "Digital Logic Applications and Design".

3AE4x **PROFESSIONAL ELECTIVE#1**

3AE41 **EMBEDDED SYSTEMS DESIGN**

Unit I : **Introduction to an embedded systems design:** Introduction to Embedded system, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Unit II : **RTOS & its overview 1:** Real Time Operating System: Task and Task States, tasks and data, semaphores and shared Data Operating system

Unit III : **RTOS & its overview 2:** Services-Message queues-Timer Function-Events-Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS

Unit IV : **Microcontroller:** Role of processor selection in Embedded System (Microprocessor V/s Micro-controller), 8051 Microcontroller: Architecture, basic assembly language programming concepts, Instruction set, Addressing Modes, Logical Operation, Arithmetic Operations, Subroutine, Interrupt handling, Timing subroutines, Serial data transmission, Serial data communication

Unit V : Embedded system development: Embedded system evolution trends Round - Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms Introduction to-assembler, compiler-cross compilers, Integrated Development Environment (IDE), Object Oriented Interfacing, Recursion, Debugging strategies, Simulators

Unit VI : **Networks for Embedded Systems:** The I²C Bus, The CAN bus, SHARC link Ports, Ethernet, Myrinet, Internet, and Introduction to Bluetooth: Specification, Core Protocol, and Cable replacement protocol, IEEE 11491 (JTAG) Testability: Boundary Scan Architecture

Textbooks:

1 Embedded Systems by Raj Kamal, TMH

2 The 8051 Microcontroller by KJ Ayala, Penram International

3 J B Peatman, Design with PIC Microcontrollers, Prentice Hall

Reference books:

1 An Embedded Software Primer by David E Simon, Pearson Education

2 Designing Embedded Hardware by John Catsoulis, O'reilly

3 Embedded System Design by Frank Vahid, Tony Givargis,", John Wiley & Sons, Inc

4 Building Embedded Linux Systems by Karim Yaghmour, O'reilly

5 Programming Embedded Systems by Michael Barr, O'reilly

6 Real-time systems & software by Alan C Shaw, John Wiley & sons, Inc

7 Computers as Components by Wayne Wolf, Harcourt India Pvt Ltd

8 Embedded System Design by Peter Marwedel, Kluwer Academic Pub

9 Programming and Customizing the AVR Microcontroller by Dhananjay Gadre, MGH

10 Fundamental of Embedded software by Daniel W Lewis, PHI

11 Bluetooth Technology by CSR Prabhu & A P Reddi, PHI

12 John B Peat man "Design with Microcontroller ", Pearson education Asia, 1998

13 Burns, Alan and Wellings, Andy, "Real-Time Systems and Programming Languages", Second Edition Harlow: Addison-Wesley-Longman, 1997

14 Raymond JA Bhur and Donald LBialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc New Jersey, 1999

15 Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development Reading " Addison-Wesley-Longman, 1998

16 Heath, Steve, "Embedded Systems Design ", Newnes 1997

3AE42 **VISUAL BASIC**

Unit I: Exploring Toolbar and the Properties Window. Visual Basic 6.0 - Properties, Methods and Events Naming conventions. Data types, Variables, Procedures and Operators in VB 6.0 Control structures (If...Then , Select Case)Control structures continued... (Do While...Loop, While... end,....)Control structures continued... (Exit For, Exit Do, With...End With)

Unit II: Arrays in VB6.0User-Defined Data Types Constants, Data Type Conversion, Visual Basic Built-in Functions Date and Time Functions Working with controls in VB6 Workingwith controls in VB6 Using a Text Box, Label, Command Button, OptionButton Working with controls in VB6. Using List Box and Combo Box Controls Working with controls in VB6. Using a Scroll Bar

Unit III: Control Arrays in Visual Basic Working with controls in VB6 Files, controls in Visual Basic 6.0,Working with controls in VB6, Using a Check Box control, working with Forms in VB6, Working with Menus in VB6, Multiple Document Interface in VB6 ,Visual Basic Functions. Input Box function, Visual Basic functions. Message Box function, Mouse events. Positioning a control

Unit IV: Graphical Mouse Applications. Mouse Move application in Visual Basic 6.0, Error-Handling, Debugging and File, Input/Output in Visual Basic 6.0, Error Handling Part 2

Unit V: Database Access Management Using ADO: Introduction and Example Exercises, Database Access Management Using ADO Part 1, Data Base Access Management Using ADO - Part 2.

Unit VI: Dynamic Link Libraries and the Windows API in Visual Basic 6.0,Writing Code that Validates User Input, Creating ActiveX Controls, Creating Active Document, Internet Programming with IIS/Web class and DHTML Applications

Text Books: 1. Microsoft Visual Basic Programming for the Absolute Beginner, Vine, PHI

2. Programming Visual Basic 2005, Jesse Liberty, O'Reilly Media Inc

3AE43 **ORACLE ESSENTIALS**

Unit I: **Introducing Oracle: The** Evolution of the Relational Database The Oracle Database Family Summary of Oracle Database Features Database Application Development Features Database Connection Features Distributed Database Features Data Movement Features Database Performance Features Database Management Features D a t a b a s e Security Features Oracle Development Tools Embedded Databases

Unit II: **Oracle Data Structures:** Data types Basic Data Structures Additional Data Structures Extended Logic for Data, Data Design Constraints Triggers Query Optimization Understanding the Execution Plan SQL Advisors Data Dictionary Tables

Unit III: **Managing Oracle:** Manageability Features Oracle Enterprise Manager Fragmentation and Reorganization Backup and Recovery Working with Oracle Support Security Auditing Compliance

Unit IV: **Oracle Performance: Performance** Tuning Basics Oracle and Disk I/O Resources Oracle and Parallelism Oracle and

Memory Resources Oracle and CPU Resources Database Resource Manager

Unit V: **Oracle Multi-user Concurrency: Basics** of Concurrent Access Oracle and Concurrent User Access Oracle's Isolation Levels Oracle Concurrency Features How Oracle Handles Locking Concurrent Access and Performance Workspaces

Unit VI: **Oracle and Transaction Processing**: OLTP Basics Oracle's OLTP Heritage Architectures for OLTP Oracle Features for OLTP High Availability Oracle Streams and Advanced Queuing Object Technologies and Distributed Components

Textbook: Oracle Essentials *Oracle Database 11g, 4e, Rick Greenwald, Robert Stackowiak, and Jonathan Stern, 2007,* O'Reilly Media, Inc.,

3AE44 **PROGRAMMING PIC MICROCONTROLLER WITH MBASIC**

Unit I: ***MBasic Compiler and Development Boards:*** The Compiler Package BASIC and Its Essentials Development Boards, Programming Style, Building the Circuits and Standard Assumptions Pins, Ports and Input/Output Pseudo-Code and Pin Architectures LED Indicators, Switching Inductive Loads, Low Side Switching, Isolated Switching, Special Purpose Switching, Fast Switching, Sound from a PIC, Switch Bounce and Sealing Current, Isolated Switching Reading a Keypad

Unit II: ***Assembler:*** The Basics Op Codes, *In-Line Assembler,* Adding Assembler to MBasic Programs, Bolt-In Assembler Functions, *Interrupt Handlers,* ISRASM, MBasic's Gateway to Assembler, Interrupt Service Routines, Program Examples.

Unit III: ***LCD Modules, Seven-Segment LED Displays and Reading Switch :***Selecting a Display, VFD Displays, Connection to PIC, Hello World LCD Module, Memory, Shifts and Lines, Font Selection, Custom Characters, LED Display Selection, Circuit Design, Pin Saving Techniques, Rotary Encoders, Reading a Relative Encoder, Dual Encoders and LCD.

Unit IV: ***Introductory Stepper Motors and DC Motor Control:*** *Stepper* Motor: Basics Programs, Introduction to Control Theory, Measure Motor Speed (Tachometer Output Pulse Width), Target Width–Measured Width, the Control Algorithm, Motor Control Programs.

Unit V: ***RS-232 Serial Interface:*** Interrupts and Timers: Overview Interrupts, Timers, Capture and Compare, How to Connect to Your PC, Voltage Levels in RS-232 and Level Conversion, Standard Pin Connections, Asynchronous Transmission, Start Bits, Stop Bits and Bit Order, MBasic's Procedures for Serial Communications, Programs.

Unit VI: ***Analog-to-Digital Conversion and Digital-to-Analog Conversion: Introduction*** to Analog-to-Digital Conversion: Resolution and Accuracy, Self-Contained DVM, DS18B20 Temperature Sensor, DS1302 Real-Time Clock, Combination Date, Time and Temperature, Introduction to Digital-to-Analog Conversion: Resolution, Accuracy and Signal-to-Noise Ratio, Sampling Theorem, DAC Circuit Design, Alternative Analog Output Solutions.

TEXT BOOK: 1, Programming the PIC Microcontroller with MBasic, by Jack R Smith

3AE5x **PROFESSIONAL ELECTIVE#2**

3AE51 NEURAL NETWORK AND PATTERN RECOGNITION

Unit I: Statistical Pattern Recognition, Classification and regression, Pre-processing and feature extraction, The curse of dimensionality, Polynomial curve fitting, Model complexity, Multivariate non-linear functions, Bayes' theorem, Decision boundaries, Minimizing risk, Probability Density Estimation, Parametric methods, Maximum likelihood, Bayesian inference, Sequential parameter estimation, Non-parametric methods, Mixture models

Unit II: Single-Layer Networks, Linear discriminant functions, Linear separability, Generalized linear discriminants, Least-squares techniques, The perceptron, Fisher's linear discriminant, The Multi-layer Perceptron, Feed-forward network mappings, Threshold units, Sigmoidal units, Weight-space symmetries, Higher-order networks, Projection pursuit regression, Kolmogorov's theorem, Error back-propagation, The Jacobian matrix, The Hessian matrix

Unit III: Radial Basis Functions, Exact interpolation, Radial basis function networks, Network training, Regularization theory, Noisy interpolation theory, Relation to kernel regression, Radial basis function networks for classification, Comparison with the multi-layer perceptron, Basis function optimization, Supervised training,

Unit IV: Error Functions, Sum-of-squares error, Minkowski error, Input-dependent variance, Modeling conditional distributions, Estimating posterior probabilities, Sum-of-squares for classification, Cross-entropy for two classes, Multiple independent attributes, Cross-entropy for multiple classes, Entropy, General conditions for outputs to be probabilities

Unit V: Parameter Optimization Algorithms, Error surfaces, Local quadratic approximation, Linear output units, Optimization in practice, Gradient descent, Line search, Conjugate gradients, Scaled conjugate gradients, Newton's method, Quasi-Newton methods, The Levenberg-Marquardt; algorithm

Unit VI: Pre-processing and Feature Extraction, Pre-processing and post-processing, Input normalization and encoding, Missing data, Time series prediction, Feature selection, Principal component analysis, Invariance and prior knowledge, Learning and Generalization, Bias and variance, Regularization, Training with noise, Soft weight sharing, Growing and pruning algorithms, Committees of networks, Mixtures of experts, Model order selection, Vapnik-Chervonenkis dimension

Textbook: Neural Networks for Pattern Recognition, Christopher M. Bishop, Oxford University Press

3AE52 **DATABASE MANAGEMENT**

Unit I: **Basic concepts:** Database & database users, characteristics of the database, database systems, concepts and architecture, date models, schemes & instances, D B M S chitecture & data independence, database languages & interfaces, data modeling using the entity relationship approach, Overview of hierarchical, Network & Relational Data Base Management Systems.

Unit II: **Relational model, languages & systems-1:** Relational data model & relational algebra: relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: date definition in SQL, view and queries in SQL, specifying constraints and indexes in sql, relational database management systems.

Unit III: **Relational model, languages & systems-2:** DB2DB2 Architecture, Logical Data Structures, Physical Data Structure, Instances, Table Spaces, Types of Table spaces, Internal Memory Structure, Background Processes, Data

Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers.

Unit IV: **Relational data base design:** Function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF,3NF & BCNF), lossless join and dependency preserving decomposition.

Unit V: **Concurrency control & recovery techniques:** Concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures.

Unit VI: **Object Oriented and Distributed Data Base Systems:** Concepts of object oriented database management systems, Distributed Data Base Management Systems.

Textbook: 1) Desai, B, "An introduction to database concepts", Galgotia publications

Reference Books:

1) Date, C J, "An introduction to database systems", 7th Edition, Addison Wesley
2) Date, C J, "An introduction to database systems", 3rd Edition, Narosa Publishing House
3) Elmsari and Navathe, "Fundamentals of database systems", Addison Wesley
4) Ullman, J D, "Principals of database systems", Galgotia publications
5) DB2 Manuals

3AE53 **WEB ENGINEERING**

Unit I : Web Engineering and Web Applications Development, Introduction , Web Application Development: Challenges and the Role of Web Engineering .

Unit II : The Web as an Application Platform, Web Design Methods, Overview of Design Issues for Web Applications Development.

Unit III: Applying the OOWS Model-Driven Approach for Developing Web Applications. The Internet Movie, Database Case Study, Modeling and Implementing Web Applications with OOHDM.

Unit IV: UML-Based Web Engineering, Designing Multichannel Web Applications as "Dialogue Systems": The IDM Model.

Unit V: Designing Web Applications with WebML and WebRatio, Hera.

Unit VI: WSDM: Web Semantics Design Method, an Overview of Model-Driven Web Engineering and the MDA.

TEXTBOOK: Scar Pastor, Daniel Schwabe, Luis Olsina,"Web Engineering: Modeling and Implementing Web Applications", Springer-Verlag London Limited, 2008

REFERENCE BOOKS:

Joel Sklar, "Principles of Web Design", Cengage Learning
James L. Mohler and Jon M. Duff, "Designing Interactive Web Sites", Cengage Learning

3AE54 **SIX SIGMA FOR ELECTRONICS DESIGN AND MANUFACTURING**

Unit I: **The Nature of Six Sigma and Other Quality Tools:** Historical Perspective, Why Six Sigma? , The Definitions of Six Sigma , Increasing the Cp Level to Reach Six Sigma, Definitions of Major Quality Tools and How They Effect Six Sigma, Mandatory Quality Tools, Quality Function Deployment (QFD), Design for Manufacture (DFM), Design of Experiments (DoE), Other Quality Tools, Process mapping .

Unit II: **The Elements of Six Sigma:** The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk, The Statistical quality control (SQC) methods, the relationship of control charts and six sigma, the process capability index (Cp) , Six sigma approach, The Cpk Approach Versus Six Sigma, Cpk and process average shift, Negative Cpk , Choosing six sigma or Cpk , Setting the process capability index , Calculating Defects Using Normal Distribution , Relationship between z and Cpk , Example defect calculations and Cpk .

Unit III: **Six Sigma and the Manufacturing Control Systems :** Manufacturing Variability Measurement and Control , The Control of Variable Processes and Its Relationship with Six Sigma, Variable control chart limits ,Control chart limits calculations, Alternate methods for calculating control limits, Control chart guidelines, out-of-control conditions, and corrective action procedures and examples, Examples of variable control chart calculations and their relationship to six sigma, Attribute charts and their Relationship with Six Sigma

Unit IV: **Manufacturing Yield and Test Strategy:** Determining Units of Defects, Example of calculating yield in a part with multiple

operations Determining assembly yield and PCB and product test levels in electronic products, PCB yield example ,Operations or Design Specifications, Determining first-time yield at the electronic product turn-on level, Example of yield calculations at the PCB assembly level, DPMO methods for standardizing defect measurements, DPMO charts , Critique of DMPO methods ,PCB test strategy , PCB test strategy example .

Unit V: **Quality and Manufacturing Costs of Electronics Products:** The Overall Electronic Product Life Cycle Cost Model , The use of the quality and cost model to achieve world-class cost and quality, Developing the background information cost estimating of electronic products, Determination of costs and tracking tools for electronic products, The Quality and Cost Relationship , The quality loss function (QLF) , Quality loss function example ,Printed circuit board (PCB) fabrication technologies, Printed circuit board (PCB) design, fabrication cost, and quality issues. PCB fabrication cost and quality alternative example.

Unit VI: **Implementing Six Sigma in Electronics Design and Manufacturing:** Six Sigma Design Project Management Models ,Axioms for creating six sigma within the organization, Cultural Issues with *the Six Sigma Based System ,Design Process, Key Processes to Enhance the Concurrent Product Creation* Process, Six sigma phased review process ,Six sigma quality advocacy and the quality systems review, Six sigma manufacturability assessment and tactical plans in production, Tools to Support Suggested Processes.

TEXT BOOK: Sammy G. Shina, "Six Sigma for Electronics Design and Manufacturing", McGraw-Hill, 2002

3AE6 **DIGITAL SIGNAL PROCESSING LABORATORY**

Minimum 10 experiments based on the syllabus of 3AE3, that are preferably uniformly distributed over the syllabus.

3AE7 PROFESSIONAL ELECTIVE#1 LABORATORY

Minimum 10 experiments each based on the syllabus of subjects included in 3AE4x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

3AE41 Embedded System Design

3AE42 Visual Basic
3AE43 Oracle Essentials
3AE44 Programming PIC Microcontrollers with MBasic

3AE8 **PROJECT AND SEMINAR**

Project (including 4AE8).The project work should be either hardware and/or software based. A project report should be submitted in three copies. Every student has to submit seminar report and deliver a seminar on advance state-of-the-art topics.

3AE9x **FREE ELECTIVE (AUDIT)**

3AE91 **ARTIFICIAL INTELLIGENCE**

Unit I: Artificial Intelligence: History and Applications, definitions, fundamental issues, challenges, growth of AI, current trends in applied AI

Unit II: Knowledge Representation: Reasoning, Issues, and Acquisition, propositional calculus, predicate calculus, rule-based knowledge representation, basic knowledge representation issues

Unit III: Heuristic Search, search as a problem-solving technique, techniques for heuristic search, hill climbing heuristic, best-first search, evaluation of heuristic functions, State space search, strategies, implementation of graph search, depth-first search, breadth first search, representation of reasoning with predicate calculus using state space, application of search technique in game playing and planning

Unit IV: Expert Systems, features, characteristics, development of ES technology, architecture, goals, basic activities, advantages, difference between ES and conventional methods, stages in the development of ES, ES tools, difficulties in developing ES, applications of expert systems

Unit V: Artificial Neural Networks, introduction, supervised learning, feed-forward neural networks, recurrent neural networks, Elman backpropagation neural network, Hopfield neural network, features of artificial neural networks, functional link neural network, Fuzzy systems, foundations, crisp set to fuzzy set, representing fuzzy elements, basic terms and operations, properties of fuzzy sets, fuzzy measures, measures of fuzziness, fuzzification, fuzziness and probability theory, membership function shape analysis, defuzzification methods, fuzzy logic in control and decision making applications, hardware realization of the analog fuzzy controller

Unit VI: Genetic Algorithms, procedures of GA, representations, initialization and selection, genetic operators, mutation, natural inheritance operators, logic behind GA, GA applications, applicability of Gas, evolutionary programming, working of evolutionary programming, swarm intelligent systems, background of ant intelligent systems, ant colony paradigm, applications of ant colony intelligence in static and dynamic combinatorial optimization problems, particle swarm intelligent systems, engineering applications of particle swarm intelligent systems

Text Book: Artificial Intelligence and Intelligent Systems, Padhy, Oxford Univ Press

3AE92 HUMAN COMPUTER INTERACTION

Unit I: **Humans in HCI:** Introduction: The Evolution of HCI, Perceptual-Motor Interaction: Some Implications for HCI, Human Information Processing: An Overview for HCI Mental Models in Human-Computer Interaction, Emotion in Human-Computer Interaction, Cognitive Architecture, An Introduction to Captology.

Unit II: **Computers in HCI:** Input Technologies and Techniques, Sensor and Recognition-Based Input for Interaction, Nonspeech Auditory Output, Network-Based Interaction, Wearable Computers.

Unit III: **Designing Human-Computer Interactions :** Visual Design: Principles for Usable Interfaces, Global/Intercultural User Interface Design , Conversational, Speech Interfaces and Technologies, Multimedia User Interface, Design Multimodal Interfaces, Adaptive Interfaces, Mobile Interaction, Human-Centered Design of Decision-Support Systems, Human-Computer Interaction in Aerospace.

Unit IV: **Designing for Diversity;** The Role of Gender in Human-Computer Interaction, Information Technology and Older Adults, HCI for Kids, Information Technology for Cognitive Support, Physical Disabilities and Computing Technologies: An Analysis of Impairments, Perceptual Impairments: New Advancements, Design, and Testing, Computing Technologies for Deaf and Hard of Hearing Users

Unit V: **Design and Development:** Putting Persons to Work: Using Data-Driven Person as to Focus Product Planning, Design and Development, Prototyping Tools and Techniques. Scenario-based Design, Participatory Design: The Third Space in HCI, Survey Design and Implementation in HCI.

Unit VI: **Evaluation and Emerging Issues:** Inspection-based Evaluations, Model-Based Evaluation, Future Trends in Human-Computer Interaction, Technology Transfer, Augmenting Cognition in HCI: 21st Century Adaptive System Science and Technology.

TEXT BOOK: Andrew Sears, Julie A. Jacko," The Human–Computer Interaction Handbook ", 2nd Edition, *Georgia Institute of Technology,* 2008 by Taylor & Francis Group.

3AE93 INDUSTRIAL MANAGEMENT

Unit I: Principles and Techniques of Management : Meaning of and differences among business, management, administration and organisation, Principles of management, functions of management, planning, organisation structure and relationships, direction, co-ordination, control, motivation, delegation and decentralisation, communication, leadership and decision making.

Unit II: Market and Materials Management : A) Marketing strategy, market research, consumer behaviour, advertising and sales promotion, channels of distribution, pricing of products.
B) Classes of material, scope of material control, scope of purchasing department, purchasing procedures, order procedures, inventroy control, introduction to production, planning and control.

Unit III: Personnel Management : Meaning and functions of personnel management, recruitment, selection, promotion, wages and salary administration, training and development, functions and scope of trade unions in Indian industries. Welfare of labour, Problems of labour turn over & retention.

Unit IV: Project and Financial Management :
A) Case studies of project report, preparation of profit and loss statement and balance sheet, ratio analysis.
B) Principles of costing, cost sheet preparation, variance analysis, meaning and application of various budgets, types of budgets and their importance.

Unit V: Quality Control :Concept of quality and quality control, elements of quality, factors controlling quality of design and conformance, process control, inspection planning and scheduling, 7QC (Seven Quality Control) techniques, vendor inspection, sampling inspection, sampling plans, Quality audit system.

Unit VI: Quality Management : Concepts and applications of Kaizen, quality circle, ISO 9000 series, just-in-time, quality planning and total quality management, elements of TQM, Quality Circles.

TEXT BOOKS :

1) Koontz H., O'Donnel C. and Whierich : Principles of Management, Tata McGraw Hill Puslishing Co. Ltd., New Delhi.
2) Khanna O.P. : Industrial Engineering and Management.
3) Mody Suresh M. : Total Quality Management, D.L.Shah and Trust, Mumbai
4) Sherlekar S.A. : Business, Organisation and Management, Himalaya Pub. House Ltd., Mumbai.
5) Gupta P.B. & Sharma P.B. : Industrial Management & Managerial Economics, Ratnasagar Pvt. Ltd., New Delhi.
6) Khanka : Entrepreneurial Development, S.Chand & Co., New Delhi.
7) Mahajan S.M. : Statistical Quality Control.

3AE94   **IPR AND PATENTS**

Unit I: **Introduction to Patents and Other Intellectual Property:** Patent and , Types of Patents, Novelty and Unobvious ness Requirement, Patent Filing Deadlines, The Scope of the Patent, Value of a Patent, Offensive Rights, Alternative and Supplementary Offensive Rights, Intellectual Property, Trademarks , Copyright, Trade Secrets, Various Types of Intellectual Property, Invention Exploitation Flowchart

Unit II: **Documentation and the PPA:** Introduction, Documents Are Vital to the Invention Process, Documentation is Vital to Prove Inventorship, Trade Secret Considerations, R e c o r d Conception and the Building and Testing of Your Invention, Record Your Invention, Record Conception or Building and Testing the Invention Disclosure, Provisional Patent Application— A Substitute for Building and Testing.

Unit III: **Patentability:** Patentability Compared to Commercial Viability, Legal Requirements for a Utility Patent, Requirement #1: The Statutory Classes, Requirement #2: Utility, Requirement #3: Novelty, Requirement #4: Unobvious ness, The Patentability Flowchart.

Unit IV: **Specification and Initial Drawings:** What Happens When Your Application Is Received by the PTO, Preliminary Work, Flowchart, Writing Your Patent Specification to Comply With the Full Disclosure Rules, Software, Computer-Related Inventions, and Business Methods, First Prepare Sketches

and Name Parts, Drafting the Specification, Review and Abstract, Checklist, Specification of Sample Patent Application

Unit V: **Marketing Your Invention:** Perseverance and Patience Are Essential, Overview Profit, Your Invention, Demonstrate a Working Model of Your Invention to Potential Customers, Finding Prospective Manufacturers/Distributors, The "NIH" Syndrome, The Waiver and Precautions in Signing It, , Presenting Your Invention by Correspondence, Making an Agreement to Sell Your Invention, Manufacturing and/or Distributing the Invention Yourself .

Unit VI: **Patent Issues: Use, Maintenance, and Infringement:** Issue Notification, Press Release, Check Errors, Patent Number Marking, Advertising, Maintenance Fees, Patent Infringement, Product Clearance, Citing Prior Art Against Patent Applications and Patents, The Court of Appeals for the Federal Circuit (CAFC), Using the Reexamination Process to Reduce the Expense of Patent Infringement Suits, JuryTrials, Arbitration, Tax Deductions and Income, Patent Litigation Financing.

TEXTBOOK: Patent It Yourself, 13th Edition, By Patent Attorney David Pressman, Nolo, 2008

3AE10   **INDUSTRIAL VISIT/TOUR**

After visiting electronics/instrumentation/allied industry, Every student shall have to submit a detailed report to the department, based on his/her observations about the organization, working, major equipments, software, engineering/technology involved, raw materials/components, products and deliverables, research and development, etc.

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FOURTH SEMESTER

4AE1   **MICROWAVE ENGINEERING**

Unit I: Microwave tubes: Electromagnetic frequency spectrum, noise in conventional tubes, Two cavity Klystron, Reflex Klystron, Traveling Wave Tube, Magnetron (cylindrical type).

Unit II: Microwave solid state devices: Tunnel diode, negative resistance amplifier, Gunn diode, parametric amplifier, PIN diode, TRAPATT, IMPATT, introduction to MASER.

Unit III: Transmission of microwaves: Rectangular wave guide, TE, TM, wave propagation, cut-off frequency, cut-off wave length, group and phase velocity, wave impedance, Circular wave guide, types of strip lines, strip line characteristics.

Unit IV: Microwave Passive Components: Microwave terminations, Attenuator, Phase shifter, Faraday's rotation, Devices employing faraday's rotation (Isolator and Circulator), Directional couplers, scattering matrix formulation of N-port junction.

Unit V: Microwave Resonator and Filter: Basic RLC resonant circuit (series and parallel), Quality factor, Rectangular cavity resonator and their Q, TEmnp, TMmnp mode propagations, Re-entrant cavity, and Circular cavity resonator.

Unit VI: Microwave communication system: Microwave link carrier chain, Troposphere scatter link using frequency diversity, LOS(Line Of sight)communication system, microwave absorption(Fading), Noise in microwave communication system.

TEXT BOOKS:
1) M.L. Sisodiya and G.S. Raghuwanshi: "Microwave Circuits and Passive devices", (WEL)
2) K.C. Gupta: " Microwave engineering"(WILEY)
3) M. Kulkarni: "Microwave and Radar Engineering" Umesh Publication

REFERENCE BOOKS:
1) Liao, Samual Y. : "Microwave devices & circuits" Tata McGraw Hill Co.Ltd., New Delhi
2) Collin, Robert E.: "Foundations for microwave Engineering" McGraw Hill, New York.
3) Pozar: Microwave Engg, Wiley Eastern

4AE2   **OPTICAL FIBER COMMUNICATIONS**

Unit I: Optical fiber wave-guide:
Total internal reflection, Snell's law, Theory of circular wave guide, Modes in optical fibers, Single mode fiber, Multimode fiber, N.A., Power flow

Unit II: Transmission Characteristics of Fiber:
Attenuation, Absorption losses, scattering losses, bending losses, dispersion, and intra modal - inter modal dispersion, bandwidth, and nonlinear effects in single-mode fiber.

Unit III: Optical Sources:
Optical emission from semiconductors, LED, efficiency, double hetero junction LED, Basic concept of Lasers, Semiconductor injection lasers.

Unit IV: Optical Fibers:
Manufacturing, fiber splicing and connectors, different manufacturing techniques, different splicing techniques and connectors.

Unit V: Detectors:
Optical detection principle, absorption, quantum efficiency, responsivity, PIN photo diode, APD and noise in photodiode.

Unit VI: Optical Electronic System:
Optical transmitter, receiver, digital system planning consideration, power budgeting coherent and noncoherent systems, modulation demodulation scheme, wavelength division multiplexing.

Text Books:
1. Senior J.M.: "Optical Fiber Communication and Application", Prentice Hall of India Pvt Ltd. New Delhi
2. G.Keiser: "Optical Fiber Communication", Mc-Graw Hill International Book Common. New York
3. R. P. Khare: Fiber Optics and Optoelectronics, Oxford University Press

Reference Books:
1) Gowe   :   Optical Communication System, Prentice Hall
2) D.K.Mynbaev   :   Fiber Optic Communication
    L.I.Scheiner   Technology, LPE, Pearson Education

4AE3   MOBILE COMMUNICATIONS

Unit I: Introduction to Cellular Mobile System: Evolution of cellular mobile systems (1st, 2nd, 3rd generation), A basic cellular system, cell shape, concept of frequency reuse, hand off strategies, power control operation of cellular systems, Example of cellular calls.

Unit II: Cellular radio system design fundamentals: Frequency assignments, channel assignment strategies, co-channel and non-co-channel interference, cellular system capacity, performance criteria, improving coverage and capacity in cellular system, multiple access schemes.

Unit III: Mobile Radio propagation & Antennas : Radio propagation mechanism, path loss modeling and signal coverage, multi path propagation, fading, Doppler shift, fast and slow fading, control of fading in mobile systems, Antennas at cell site, mobile antenna, diversity.

Unit IV: Digital Cellular Systems: GSM: system architecture, radio subsystem, channel types, frame structure, signal processing in GSM, CDMA (IS 95): frequency and channel specifications, forward & reverse CDMA channel.

Unit V: Cordless systems and WLL: Introduction to cordless systems, CT2 and DECT
standards, DECT architecture, DECT Frame format and radio link, DECT operation.
WLL: role of WLL, propagation considerations for WLL, LMDS and MMDS.

Unit VI: Wireless LAN: Overview of wireless LAN, wireless LAN technologies; infrared, spread-spectrum, narrow band microwave LAN, mobile data networks: CDPD, GPRS, WAP. Bluetooth: overview, radio specification, base band specification, link manager specifications.

TEXT BOOKS:
1) William CY Lee : "Mobile Cellular Telecommunications"(second Edition) McGraw Hill Inc. (1995)
2) Theodore S. Rappaport : "Wireless Communications: Principles & Practice 2nd Edition, Pearson education.

REFERENCE BOOKS:
1) William Stallings: "Wireless Communications and Networks" Pearson Education Asia Publication (2002)
2) K.Pahlavan and P.Krishnamurthy: "Principles of Wireless Networks",

Pearson Education Asia Publication (2002)
3) Jochen Schiller: "Mobile Communications", Pearson Education Asia Publication (2002)
4) Andy Dornam : "The Essential Guide to Wireless Communication Applications", Pearson Education Asia Publication.
5) Rajkamal : "Mobile computing " Oxford university press"

4AE4x   PROFESSIONAL ELECTIVE#1

4AE41   DSP with TMS 320C54xx

Unit I: Architectural overview of TMS 320C5X (I):
TMS320 Family overview, History, Development and advantages of TMS320 DSP, Key features of TMS320C5X, Bus structure, CPU, Central Arithmetic Logic Unit, Parallel logic unit, Auxiliary register arithmetic unit, registers in TMS3205X and on chip peripherals of TMS320C5X.

Unit II: Architectural overview of TMS 320C5X (II):
Program controller, Program counter hardware stack, program memory address generation, status and control registers, conditional operations, single instructions repeat functions, block repeat functions, interrupts, reset and power down mode.

Unit III: Pipeline and Memory structure of TMS320C5X:
Pipeline structures, pipeline operations, normal pipeline operations, pipeline operation on branch and subroutine call, pipeline operation on ARAU memory mapped registers, pipeline operation on external memory conflict, Memory space overview, program memory, local data memory, global data memory, input output space, direct memory access, memory management.

Unit IV: Addressing modes in TMS320C5X:
Direct addressing, indirect addressing options, bit reverse addressing, immediate addressing, short and long immediate addressing, dedicated register addressing using contents of BMAR, dedicated register addressing using contents of DBMR, memory map register addressing, circular addressing.

Unit V: Instruction set of TMS320C5X (I):
Accumulator memory reference instructions: ABS, ADCB, ADD, ADDT, AND, BSAR, CRGT, EXAR, LACB, LAMM, NORM, ORB, SAMM, SBB, SFRB, SUB, SUBT, XORB, ZALR, ZAP etc.
Auxiliary register and data memory page pointer instructions:

ADRK, CMPR, LAR, LDP, MAR, SAR, SBRK, LT.

Parallel logic unit (PLU) Instructions: APL, CPL, OPL, SPLK, XPL, LPH

Unit VI: Instruction set of TMS320C5X (II):

TREGO, PREG, AND, MULTIPLY INSTRUCTION: LTA, MAC, MACD, MPY, SPL, SQRS, ZPR, MPYU, SPH, LTD, LTP, etc

Branch and Call Instructions: B, BACC, BANZ, CALA, CALL, INTR, NMI, RET, TRAP, XC, etc.

I/O and Data memory, control instructions: IN, OUT, BLDP, LMMR, BIT, LST, PUSH, POP, RPT, RPTZ, SETC, SST, etc.

Text Book : TMS320C5X User's guide: Texas Instruments Inc.

4AE42 **LOW POWER VLSI DESIGN**

Unit I: **Need for low power VLSI chips :**Sources of power dissipation on Digital Integrated circuits Emerging Low power approaches Physics of power dissipation in CMOS devices Device & Technology Impact on Low Power Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation

Unit III: **Low Power Design:** Circuit level: Power consumption in circuits Flip Flops & Latches design, high capacitance nodes, low power digital cells library Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

Unit IV: **Low power Architecture & Systems:** Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design

Unit V: **Low power Clock Distribution:** Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network

Unit VI: **Algorithm & architectural level methodologies:**
Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis

Textbook:

1) Gary K Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002

2) Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

Reference Book:

1) Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

4AE43 **DIGITAL IMAGE PROCESSING WITH MATLAB**

Unit I: Introduction, Background, digital image processing, background on MATLAB and the Image Processing Toolbox , The MATLAB Working Environment

Unit II: Fundamentals, Digital Image Representation, Reading, Displaying and Writing Images, Data Classes, Image Types, Converting between Data Classes and Image Types, Array Indexing, Some important standard arrays, introduction to M-function programming

Unit III: Intensity Transformation an Spatial Filtering, intensity transformation functions, histogram processing and function plotting, spatial filtering, image processing toolbox standard spatial filters.

Unit IV: Frequency domain processing, the 2-D Discrete Fourier Transform, computing and visualizing the 2-D DFT in MATLAB, Filtering in the frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, sharpening frequency domain filters

Unit V: Image restoration, a model of the image degradation/ restoration process, noise models, restoration in the presence of noise only- spatial filtering, periodic noise reduction by frequency domain filtering, modeling the degradation function, direct inverse filtering, Wiener filtering

Unit VI: Color image processing, color image representation in MATLAB, converting to other color spaces, the basics of color image processing, color transformations, spatial filtering of color images

Textbook: Digital Image Processing Using MATLAB, Rafael C. Gonzalez, Richard Woods, Steven Eddins, Pearson Education, 2004

4AE44 **LAB VIEW BASED VIRTUAL INSTRUMENTATION**

Unit I: Virtual Instrumentation: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming

Unit II: Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming VI programming techniques: VIS and

sub-VIS, loops and charts,

Unit III: Arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web

Unit IV: Data acquisition basics: Introduction to data acquisition on PC, Sampling fundamentals,Input/Output techniques and buses ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements

Unit V : Chassis requirements Common Instrument Interfaces: Current loop, RS 232C/RS485, GPIB Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Fire wire PXI System c o n t r o l l e r s , Ethernet control of PXI Networking basics for office & Industrial Applications, VISA and IVI

Unit VI: Toolsets, Distributed I/O modules Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems Using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control

TEXTBOOKS:

1) Gary Johnson, Lab VIEW Graphical Programming, Second edition, McGraw Hill, Network, 1997

2) Lisa K wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey,1997

REFERENCE BOOK:

1) Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000

4AE5x **PROFESSIONAL ELECTIVE#2**

4AE51 **SMART SENSORS**

Unit I: **Smart Sensor and the Nature of Semiconductor Sensor Output:** Mechanical-Electronic Transitions in Sensing, Nature of Sensors, Integration of Micromachining and Microelectronics, Sensor Output Characteristics, Wheatstone bridge, Piezoresistivity in Silicon, Semiconductor Sensor Definitions, Static versus Dynamic Operation, Noise/Interference Aspects.

Unit II: **Sensing Technologies:** Capacitive Sensing, Piezoelectric Sensing, Hall Effect, Chemical sensors, Improving Sensor Characteristics, Digital Output Sensors, Incremental Optical Encoders, Digital Techniques, Low-Power, Low-Voltage

Sensors, Combined Solution: Micromachining and Microelectronics.

Unit III: **Getting Sensor Information into the MCU :** Amplification and Signal Conditioning, Instrumentation Amplifiers, Switched-Capacitor Amplifier , Barometer Application Circuit , 4- to 20-mA Signal Transmitter , Inherent Power-Supply Rejection,Separate Versus Integrated Signal Conditioning , Integrated Passive Elements , Integrated Active Elements , Digital Conversion , A/D Converters , Performance of A/D Converters , Implications of A/D Accuracy and Errors.

Unit IV: **MCUs/DSPs to Increase Sensor IQ :** MCU Control , MCUs for Sensor Interface Peripherals ,Memory , Input/Output , Onboard A/D Conversion , Power-Saving Capability , Local Voltage or Current Regulation , Modular MCU Design , DSP Control , Algorithms Versus Lookup Tables , Techniques and Systems Considerations , Linearization , PWM Control , Autozero and Autorange , Diagnostics , Reducing Electromagnetic Compatibility and Radio Frequency Interference , Indirect (Computed, Not Sensed) Versus Direct Sensing , Software, Tools, and Support , Sensor Integration .

Unit V: **Control Techniques :** Programmable Logic Controllers , Open-Versus Closed-Loop Systems, PID Control , State Machines, Fuzzy Logic , Neural Networks , Combined Fuzzy Logic and Neural Networks ,Adaptive Control ,Observers for Sensing, Other Control Areas , RISC Versus CISC , Combined CISC, RISC, and DSP ,The Impact of Artificial Intelligence .

Unit VI: **Transceivers, Transponders, and Telemetry :** The RF Spectrum, Spread Spectrum, Wireless Data and Communications, Wireless Local Area Networks, FAX/Modems, Wireless Zone Sensing, Optical Signal Transmission, RF Sensing Surface Acoustical Wave Devices, Radar, Global Positioning System, Remote Emissions Sensing Remote KeylessEntry, Intelligent Transportation System, RF-ID , Other Remote Sensing Measuring RF Signal Strength, Telemetry, RF MEMS.

Textbook: Understanding Smart Sensors, Randy Frank, 2e, Artech House

4AE52 **INTRODUCTION TO NANOTECHNOLOGY**

Unit I: **Introduction to Nanotechnology:** Nanotechnology – Definition and Examples, Background and Research Expenditures Lessons from Nature (Biomimetics), Applications in Different Fields, Various Issues, Research Training.

Unit II: **Introduction to Carbon Nanotubes:** Structure of Carbon Nanotubes, Synthesis of Carbon Nanotubes ,Growth Mechanisms of Carbon Nanotubes , Properties of Carbon Nanotubes , Carbon Nanotube-Based Nano-Objects , Applications of Carbon Nanotubes.

Unit III: **Nanowires:** Synthesis, Characterization and Physical Properties of Nanowires, Applications, Template-Based Synthesis of Nanorod or Nanowire Arrays: Template-Based Approach, Electrochemical deposition, Electrophoretic Deposition, Template Filling, Converting from Reactive Templates.

Unit VI: **Introduction to Micro/Nanofabrication:** Basic Microfabrication Techniques, MEMS Fabrication Techniques, Nanofabrication Techniques, Nanoimprint Lithography: Emerging Nanopatterning Methods, Nanoimprint Process, Tools and Materials for Nanoimprint, Applications.

Unit V: **Stamping Techniques for Micro- and Nanofabrication:** High-Resolution Stamps , Microcontact Printing , Nanotransfer Printing , Applications , Material Aspects of Micro- and Nanoelectromechanical Systems: Silicon , Germanium-Based Materials ,Metals , Harsh-Environment Semiconductors , GaAs, InP, and Related III–V materials ,Ferroelectric Materials, Polymer Materials, Future Trends.

Unit VI: **Nanorobotics:** Overview of Nanorobotics, Actuation at Nanoscales, Nanorobotic Manipulation Systems, Nanorobotic Assembly, Applications, Packaging and Reliability Issues in Micro/Nano Systems: Introduction to Micro-/Nano-Electromechanical (MEMS)/ (NEMS) Packaging, Hermetic and Vacuum Packaging and Applications, Thermal Issues and Packaging Reliability, Future Trends.

TEXT BOOK:

Bharat Bhushan (Ed.)," Springer Handbook of Nanotechnology",2nd revised and extended edition, 2007

4AE53 **PROGRAMMABLE LOGIC CONTROLLERS**

Unit I: **Programmable logic Controllers:** Introduction, Hardware, Internal architecture, PLC systems, Input devices, Output devices, Examples of applications, Number systems**:** The binary system, Octal and hexadecimal, binary arithmetic, PLC data, Input/output units, Signal conditioning, remote connections, Networks, Processing inputs, I/O addresses.

Unit II: **Ladder and functional block programming:** Ladder diagrams, Logic functions, Latching, Multiple outputs, Entering programs, Function blocks, Program examples, Instruction lists, Sequential function charts, structured text

Unit III: **Programming methods:** IL, SFC and ST, Internal relays**:** Internal relays, Ladder programs, Battery-backed relays, Jump and call: One-shot operation, Set and reset, Master control relay, Jump, Subroutines.

Unit IV: **Timers and counters:** Types of timers, Programming timers, Off-delay timers, Pulse timers, Programming examples, Forms of counter, Programming, Up and down counting, Timers with counters, Sequencer, Shift registers, Ladder programs, Shift registers**:** registers and bits.

Unit V: **Data handling**: Data handling, Arithmetic functions, closed loop control, Program development, Safe systems, Commissioning, Fault finding, System documentation.

Unit VI: **Designing systems:** Temperature control, Valve sequencing, Conveyor belt control, Control of a process.

Textbook: W. Bolton, "**Programmable Logic Controllers**," Fourth Edition Elsevier, 2006

4AE54 **ROBOTICS**

Unit I : Introduction to Robotics: Definition, Brief History, uses of robots Basic principle in robotics, Types of robots, Technology of robotics, notations used in analysis,

Unit II : System modeling and analysis: Position and orientation of rigid bodies, Denavit-Hartenberg Notation, homogenous transformation, forward and inverse position analysis, Block diagram and simulation.

Unit III: Electronics in Robotics: computing elements in robotics, Passive Electrical Components, Active Elements, Analog computer, Timer 555, Analog to digital conversion, Digital to analog conversion, digital computer, architecture ofmicroprocessor, Microcontroller, programmable Logic controller, computer peripheral.

Unit IV: Sensors and transducers: Sensors for motion and position measurement, Force, Toque and Tactile sensors, Temperature sensing devices, Ultrasonic sensors, Range sensors, Sensors for Condition Monitoring, Data acquisition system in robotics, Transducer signal conditioning for data conversion.

Unit V: Actuating Devices: DC servomotor, AC servo Motor, Brushless Permanent Magnet DC, Permanent Magnet stepper motor, Pneumatic, hydraulic and electric actuators, Fluid power actuation, Fluid power design Elements, Piezoelectric Actuators, micro actuator, Drive Selection and Applications.

Unit VI: Case studies: Transportation Bridge surface Materials, Robotic system for automotive Application, Slip casting process, Pick and Place Robot, Cleaning Robot, Lawn-moving robot, Robot in assembly (Puma560),SCARA,Cincinatti Milacron

Text Books:

1) Devdas Shetty, Richard A. Kolk: "Mechatronics System Design", Thomson Brooks/ Cole. Pubs. 2nd edition, 2007

2) Appuu Kuttan K.K.: "Introduction to MECHATRONICS", Oxford university Press, 2007

3) Ashitava Ghosal,"ROBOTICS, fundamental concepts and analysis", Oxford university press, 2008

Reference Book:

1) Bruno siciliano, Oussama Khatib "Springer Handbook on Robotic", Springer, 2008

4AE6   MICROWAVE ENGINEERING AND OPTICAL FIBER COMMUNICATIONS LABORATORY

Minimum 10 experiments based on the syllabus of 4AE1 and 4AE2, that are preferably uniformly distributed over the syllabi of both the subjects.

4AE7   PROFESSIONAL ELECTIVE #1 LABORATORY

Minimum 10 experiments each based on the syllabus of subjects included in 4AE4x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

4AE41   DSP with TMS 320C54xx

4AE42   Low Power VLSI Design

4AE43   Digital Image Processing with MATLAB

4AE44   LabVIEW based Instrumentation

4AE8   PROJECT AND SEMINAR

Project (including 3AE8).The project work should be either hardware and/or software based. A project report should be submitted in three copies. Every student has to submit seminar report and deliver a seminar on advance state-of-the-art topics.

4AE9x   FREE ELECTIVE (AUDIT)

4AE91   ENGINEERING ETHICS

Unit I: The importance of ethics in science & engineering. Managing ethical issues, The role of codes of ethics. The person and the virtues: Developing a model for a person, Limitation of the model, Habits and morals. The four main virtues. Real life example

Unit II: Analysing exterior acts: Ethics as a craft, distinguishing exterior & interior morality. Beginning case analysis, Event trees. Analyzing interior Intentions: Describing intention, The importance of intention. Efforts & virtues, the role of benevolence, a real life case.

Unit III: Hierarchy of moral values

Hierarchies of values: Moral and Nonmoral, line drawing, Mathematical Analogies, Ranking of virtues, ethical judgment, Moral judgment: The decisive role of intention, evaluating interior goodness, co-operating in the evil of others, Moral responsibility: factors limiting moral responsibility, degrees of responsibility, the sainthood and devil problems.

Unit IV: Truth: Person to person, truth in actions, truth in words, Harm from deception, harm from withholding truth, whistle blowing, Harm from spreading truth, privacy, Truth, Social. Distinction between science & engineering, Approach to knowledge in technology, intellectual property.

Unit V: Fairness: Person to person, Conflict of interest, qualitative versus Quantitative fairness, Credit or blame in team projects, authorship questions, fairness in supervising, fairness in contracting with clients.Fairness: Social, Intellectual property & the society, environmental issues, experts & paternalism, social aspects of employment.

Unit VI: Resource allocation, Defining safety & risk, evaluating risk, making decisions about risk, dealing with different ethical systems, Habit & intuition.

Text Book:

1) Edmond G. Seebauer : Fundamentals of Ethics for Scientists & Robert L. Barry   Engineering Oxfords University Press.

4AE92   ARM SYSTEM DEVELOPMENT AND DESIGN

Unit I: **Introduction to Processor Design:** Processor architecture and organization Abstraction in hardware design MUO, a simple processor Instruction set design, Processor design trade-offs, The Reduced Instruction Set, Computer Design

for low power consumption.

Unit II: **The ARM Architecture:** The Acorn RISC Machine Architectural inheritance The ARM programmer's model ARM development tools.

Unit III: **ARM Assembly Language Programming:** Data processing instructions, Data transfer instructions, Control flow instructions, writing simple assembly language programs.

Unit IV: **ARM Organization and Implementation:** 3-stage pipeline ARM organization, 5-stage pipeline ARM organization , ARM instruction execution, ARM implementation ,The ARM coprocessor interface.

Unit V: **The ARM Instruction Set -1:** Introduction, Exceptions, Conditional execution Branch and Branch with Link (B, BL) Branch, Branch with Link and exchange (BX, BLX) Software Interrupt (SWI) Data processing instructions, multiply instructions, Count leading zeros (CLZ - architecture v5T only) Single word and unsigned byte data transfer instructions ,Half-word and signed byte data transfer instructions.

Unit VI: **The ARM Instruction Set -2:** Multiple register transfer instructions, Swap memory and register instructions (SWP) ,Status register to general register transfer instructions, General register to status register transfer instructions, Coprocessor instructions, Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture V5T only) ,Unused instruction, space Memory faults ,ARM architecture variants.

TEXT BOOK:-

ARM SYSTEM ON-CHIP ARCHITECTURE, Steve Furber

4AE93 **CMOS VLSI DESIGN**

Unit I: **Introduction:** Basic principle of MOS transistor, Introduction to large signal MOS models (long channel) for digital design

Unit II: **The MOS Inverter:** Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, transfer characteristics, logic threshold, Noise margins, and Dynamic behavior, Propagation Delay, Power Consumption

Unit II: **MOS Circuit Layout & Simulation:** MOS SPICE model, device characterization, Circuit characterization, interconnects simulation MOS device layout: Transistor layout, Inverter layout, CMOS digital circuit's layout & simulation.

Unit IV: **Combinational MOS Logic Design:** Static MOS design: Complementary MOS, Ratioed logic, Pass Transistor logic,

complex logic circuitsDynamic MOS design: Dynamic logic families and performances

Unit V: Sequential MOS Logic Design: **Static latches, Flip flops & Registers, Dynamic** Latches & Registers, CMOS Schmitt trigger, Monostable sequential Circuits, Astable Circuits Memory Design: ROM & RAM cells design

Unit VI: Interconnect & Clock Distribution: **Interconnect delays, Cross Talks, Clock Distribution Introduction to low power design, Input and Output Interface circuits BiCMOS Logic Circuits: Introduction, BJT Structure & operation, Basic BiCMOS Circuit behavior, Switching Delay in BiCMOS Logic circuits, BiCMOS Applications**

Textbook:1) Weste and Eshraghian, "Principles of CMOS VLSI design" Addison-Wesley, 2002

Reference books:

1) Kang & Leblebigi "CMOS Digital IC Circuit Analysis & Design"- McGraw Hill, 2003

2) Rabey, "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003

4AE94 **REMOTE SENSING AND GIS**

Unit I: Concept of remote sensing: Introduction, distance of remote sensing, definition of remote sensing, data, remote sensing process, source of energy, interaction with atmosphere, interaction with target, interaction with the atmosphere again, recording of energy by sensor, transmission, reception and processing.

Unit II: Remote sensing: Interpretation and analysis, applications of remote sensing, advantages of remote sensing, limitations of remote sensing, ideal remote sensing.Remote sensing platforms and sensor characteristics. Introduction, characteristics of images, remote sensing platforms, sensor resolutions.

Unit III: History of remote sensing and Indian space program: Introduction, early age, middle age, space age, photographic imaging- Introduction, digital imaging- Introduction, sensor, PAN Multi spectral imaging, hyper spectral imaging, thermal imaging.

Unit IV: Microwave remote sensing: Introduction, passive microwave remote sensing, active microwave remote sensing, RADAR imaging, GLOBAL POSITIONING SYSTEM-
Introduction, global navigation satellite system, Visual image

interpretation- introduction, information extraction by human and computer.

Unit V: Applications of remote sensing: Introduction, land cover and land used, agriculture, forestry, geology, mapping, oceans and coastal monitoring, monitoring of atmospheric constituents.

Unit VI: Concept of geographic information system: Introduction, definition of GIS, key components of GIS, functions and advantages of GIS, Applications areas. Modern trends of GIS- Introduction, integration of GIS and remote sensing, integration of GIS and multimedia, 3D GIS, 4D GIS and real time GIS, mobile GIS.

Text Book: **B. Bhatta- REMOTE SENSING AND GIS, Oxford university press higher education**

*****

DIRECTION

No. 24/2010   Date : 24/06/2010

          Subject : Examinations leading to the Degree of Master of Science
                    in Applied Electronics (Two-Year Course .... Semester
                    Pattern)

          Whereas, Direction No. 13 of 2009 in respect of Examinations
leading to the Degree of Master of Science in Applied Electronics (Two-
Year Course .... Semester Pattern) is in existence in the University,
                              AND
          Whereas, the Academic Council in its meeting held on 20-02-2010
vide Item No. 16 (6) A) R-1) resolved to accept following addition in the
scheme of III Semester M.Sc. (Applied Electronics) after Sr. No. 9 :-
     "10. 3 AE 10   Industrial Visit / Tour   - - - - - - - - - - - - - - - -"
                              AND
          Whereas, the schemes of teaching & examinations of I to IV
Semesters Master of Science in Applied Electronics course are required to
be regulated by the Regulation,
                              AND
          Whereas, the process of making the Regulation is likely to take
some time,
                              AND
          Whereas, the schemes of teaching & examinations of III & IV
Semesters Master of Science in Applied Electronics course are to be
implemented from the academic session 2010-2011,
                              AND
          Whereas. syllabus for III & IV Semesters Master of Science in
Applied Electronics course is to be sent for printing.
          Now, therefore, I, Dr. Ku. Kamal Singh, Vice-Chancellor of Sant
Gadge Baba Amravati University in exercise of powers confirmed upon me
under sub section (8) of Section 14 of the Maharashtra Universities Act,
1994, hereby direct as under :-
1)   This Direction shall be called "Examinations leading to the Degree
          of Master of Science in Applied Electronics (Two-Year Course ....
          Semester Pattern) Direction, 2010"
2)   This Direction shall come into force from the date of its issuance.
3)   Following addition be made in the scheme of III Semester M.Sc.
          (Applied Electronics) after Sr. No. 9 :-
          "10. 3 AE 10   Industrial Visit / Tour   - - - - - - - - - - - - - - - -"

                              Sd/-
                              Dr. Kamal Singh
                              Vice-Chancellor
                    ****

M.Sc. Sem. I to Sem. IV
(Microbiology)

Prospectus No. 2017128

संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY

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SANT GADGE BABA AMRAVATI UNIVERSITY
SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.
Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.

Ordinance No.19/2001 : An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dr. Ajay P. Deshmukh
Registrar
Sant Gadge Baba Amravati University.

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM.

The pattern of question paper as per unit system will be broadly based on the following pattern

(1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.

(2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.

(3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.

(4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60

(5) Each short answer type question shall contain 4 to 8 short sub question with no internal choice.

%ORDINANCE NO. 4 of 2008

Examinations leading to the Degree of विज्ञान पारंगत (Master of Science)(Four Semesters Degree Course), Ordinance, 2008.

Whereas it is expedient to provide an Ordinance regarding Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semesters Degree Course), in the faculty of Science. The Management Council is hereby pleased to make the following Ordinance.

1. This Ordinance may be Called, "Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semesters Degree Course), Ordinance, 2008".

2. This Ordinance shall come into force w.e.f. the date of its approval by the Management Council.

3. The duration of the course shall be two academic years,

    (a) M.Sc. Course is divided into Semester-I, Semester-II, Semester-III & Semester-IV.

    (b) University shall hold examinations in Winter and in Summer every year for all semesters.

    (c) The main examination of odd semesters shall be held in Winter and the main examination of even semesters shall be held in Summer every year. The supplementary examination for odd semesters shall be held in Summer and the supplementary examination for even semesters shall be held in Winter every year.

4. The period of Academic Session/Term shall be such as may be notified by the University and the Examination shall be held at such places and on such dates as may be fixed by the Board of Examinations.

5. Subject to their compliance with the provisions of this Ordinance and of other Ordinances in force from time to time, the following persons shall be eligible for admission to the examinations, namely:-

    (A) For विज्ञान पारंगत भाग-१ प्रथम सत्र M.Sc.Part-I:-

    (a) A collegiate candidate admitted to the Degree of Bachelor of Science who has prosecuted a regular course of study in a college or a University Department.

    (b) a teacher admitted to the Degree of Bachelor of Science and eligible under Ordinance No. 18;

    (c) a woman candidate admitted to the Degree of Bachelor of Science, who has not pursued a course of study in the University or a College;

% As approved by Management Council on dated 30.5.2008, Vide Item No. 196, and latest amended vide Ordinance No. 14 of 2009 (M.C. dated 25.5.09)

Provided that, applicants eligible under clauses (b) and (c) above shall, if laboratory work is prescribed in the subject which they offer for examination, attend the full course of laboratory instruction in the University Department or a College or a recognised Institution imparting instruction upto the standard of the examination;

Provided further, that in the case of applicants under clauses(b) and (c) above, not less than one academic year shall have elapsed since the date of their passing the examination for the Degree of विज्ञान स्नातक (Bachelor of Science);

(d) Candidate who has passed B.Sc.Examination of Sant Gadge Baba Amravati University with Chemistry as one of the optional subjects and has also passed the Diploma of Associateship of Institution of Chemists (India) Calcutta and is working as Jr/Sr.Laboratory Asstt. in National Environmental Engineering Research Institute, Nagpur (NEERI) or Council of Scientific and Industrial Research (CSIR), Nagpur or Indian Bureau of Mines (IBM) will be eligible to appear at M.Sc.Semester-I in Chemistry only, without prosecuting a regular course of study in a College/ Department in the University.

Provided he produces certificate of completion of practical course prescribed for M.Sc. Part-I (Semester-I & Semester-II) Examination in Chemistry from his employer.

(e) any other graduate in Science not eligible under clause (a) (b) or (c) above, shall be eligible for admission to the examination in Mathematics only, after a lapse of not less than one academic year since the date of his passing the examination for the Degree of विज्ञान स्नातक (Bachelor of Science):

(f) an applicant holding the भेषजी स्नातक (B.Pharm) or the विज्ञान स्नातक कृषी (B.Sc.Agri.) Degree shall be eligible for admission to the विज्ञान पारंगत (M.Sc.) Course in Biochemistry only;

(Note: The विज्ञान स्नातक (B.Sc.) Degree referred to in clause (a) above, shall include the विज्ञान स्नातक (B.Sc.) Degree of the University or an equivalent Degree of any other Statutory University)

(g)   an applicant holding the B.Sc. (Ind.Chem.) Degree of the Banaras Hindu University;

(h)   an applicant holding B.A./B.Sc. with Mathematics/ Statistics or Bachelor of Computer Science Degree for admission to M.Sc. Course in Statistics or Mathematics ;

(i)   i)   for admission to M.Sc. Microbiology a candidate shall have offered Microbiology or Industrial Microbiology or Biochemistry as a subject of study and examination at the B.Sc. degree.

        ii)   for admission to M.Sc. Biochemistry a candidate shall have offered Microbiology or Industrial Microbiology or Biochemistry as a subject of study and examination at the B.Sc. degree.

            For admission to M.Sc.Biochemistry, in case of vacancies, a students offering Chemistry alongwith Biological Science shall be admitted.

(j)   i)   for admission to M.Sc. Electronics (Instrumentation) a candidate shall have offered Physics or Electronics (Instrumentation) or Electronics or Electronics Science or Computer Maintenance as subjects of study and examination at the B.Sc. level and B.C.S. degree of this University or any other equivalent Degree of Statutory University.

        ii)   a person passing B.E. (Electronics & Telecommunication or Industrial Electronics) Examination of Sant Gadge Baba Amravati University is eligible to take admission direcltly at second year of M.Sc. Electronics (Instrumentation). Such a student who is admitted to second year of M.Sc. Electronics (Instrumentation) shall be awarded M.Sc. degree on the basis of his performance at M.Sc. Part-II only.

(k)   for admission to (M.Sc.) Geography a candidate shall have offered Geography as a subject to study and examination at the B.Sc. Degree.

(l)   for admission to (M.Sc.) Petrochemical Science, a candidate shall have offered Petrochemical Science subject to study and examination at the B.Sc. Degree.

(m)   i)   for admission to M.Sc. Part-I (Environmental Science) a candidate shall have offered one of the optional subject as Environmental Science or Botany or Zoology or Life Sciences or Microbiology or Biochemistry or Biotechnology at B.Sc. degree,

        ii)   Sixty percent seats of the total intake shall be reserved for students who have passed B.Sc. with Environmental Science. If students having Environmental Science as an optional subject are not available then students having other optional subjects be considered.

(n)   for admission to M.Sc. Geoinformatics or Remote Sensing and GIS, a candidate shall have passed B.Sc. in any discipline of Life Sciences. Preference shall be given to graduates having offered Geology at undergraduate level.

(o)   for admission to M.Sc. Bioinformatics a candidate shall have passed B.Sc. in any discipline of Life Sciences, Bio Sciences or Bachelor Degree in Agriculture, Veternary and Fishery Sciences, Pharmacy, or Medical Sciences - Bachelor of Medicine and Bachelor of Surgery, Bachelor of Dental Surgery, B.A.M.S., B.H.M.S. or any equivalent examination recognised by Sant Gadge Baba Amravati University.

(B)   For विज्ञान पारंगत भाग-२ (M.Sc. Part-II) Examination:-

    (a)   a student who has been admitted to the Degree of विज्ञान स्नातक (Bachelor of Science) and who has since passing the M.Sc.Part-I (Semester-I & II) Examinations, prosecuted a regular course of study for not less than one academic year in the University or in the College in the subject in which he offers himself for the M.Sc.Part-II Examinations;

    (b)   a teacher admitted to the Degree of विज्ञान स्नातक (Bachelor of Science) and eligible under Ordinance

No. 18 and who has not less than one academic year previously, passsed the M.Sc.Part-I Examination in the subject in which he offers himself for M.Sc.Part-II Examinations;

(c) a woman candidate admitted for the Degree of विज्ञान स्नातक (Bachelor of Science) and who has not less than one academic year previously, passed the M.Sc. Part-I Examination in that subject in which she offers herself for the M.Sc. Part-II Examinations;

(d) a candidate who has been admitted under Para 3 (A) (d) above and who has not less than one academic year previously, passed M.Sc. Part-I Examination in the subject Chemistry in which he offers himself for the M.Sc.Part-II Examination.

Provided he produces a certificate of completing of practical course prescribed for M.Sc. Part-II Examination in Chemistry from his empolyer;

(e) any other Graduate in Science not eligilbe under clause (a) (b) or (c) who has not less than one academic year presiously, passed the M.Sc. Part-I (Semester-I & Semester-II) Examinations in the subject which he offers himself for the Part-II Examination;

6. Subject to his / her compliance with the provisions of this Ordinance and other Ordinances (Pertaining to Examination in General) in force from time to time, the applicant for admission, at the end of the course of study of a perticular term shall be eligible to appear at it, if,

(i) He / She satisfied the conditions in the table and the provisions thereunder.

(ii) He / She has prosecuted a regular course of study in the university / college affiliated to the university.

(iii) He / She has in the opinion of the Head of the Department / Principal shown satisfactory progress in his / her study.

Name of Exam.	The student should have passed the Examination of satisfacotry	The student should have completed the session/semester
M.Sc.Part-I(Semester-I)	The qualifying examination mentioned in para 5	M.Sc.Part-I (Semester-I)
M.Sc.Part-I (Semester-II)		M.Sc.Part-I (Semester-I & II)
M.Sc.Part-II (Semester-III)	Semester-I	M.Sc.Part-II (Semester-III)
M.Sc.Part-II (Semester-IV)	Semester-I	M.Sc.Part-II (Semester-III & IV)

7. Without prejudice to the provisions of Ordinance No.6 relating to the Examinations in General, the provisions of Paragraphs 8,10, and 31 of the said Ordinance shall apply to every collegiate candidate.

8. The fee for each Semester Examination shall be as prescribed by the University time to time.

Provided that a non-collegiate candidate, other than an ex-student shall also pay a registration fee as prescribed by the University time to time.

9. Every candidate for admission to the examination shall offer one of the following subjects for his examination, namely-

(1) Mathematics,
(2) Physics,
(3) Chemistry,
(4) Botany,
(5) Zoology,
(6) Geology,
(7) Statistics,
(8) Biochemistry,
(9) Microbiology,
(10) Electronics (Instrumentation),
(11) Geography,
(12) Geoinformatics,
(13) Remote Sensing & GIS,
(14) Environmental Science, and
(15) Bioinformatics.

Provided firstly, that an examinee who has passed Part-II Examination in one of the subjects listed above from 1 to 15 and is desirous of appearing.

    (a) in any other subject, or

    (b) in a new paper or a combination of papers in the subject in which he has passed, may, without prosecuting a regular course of study present himself in any subsequent academic year for Part-I of the Examination in that other subject or that new paper or new combination of papers, and after not less than one academic year after passing the said Part-I Examination, for Part-II Examination in the said new paper or the said new combination of papers.

Provided secondly, that a candidate eligible for appearing at a examination under the first proviso shall, in the subject or a new paper or the new combination of papers which he is offering for the examination, attend the full course of practical Training, wherever such training is prescribed in the University Department or a College or a recognised Institution imparting instruction upon the standard of the Examination.

Provided thirdly, that an examination successful under clause (b) of the first proviso shall not be awarded division nor shall he be eligible for any scholarship, medal or prize of the University.

10. An examinee at the M.Sc.Part-I or the M.Sc. Part-II Examination shall have the option of not being declared successful at the examination in case he does not secure a minimum of Second Division marks /Higher Second Division marks fifty five percent marks (55%) at the Examination. The option will have to be exercised everytime an application is submitted to any of the three examinations and shall be on the proforma printed on the application form itself. Once exercised the option shall be binding upon the examinee, and shall not be revoked under any circumstances.

11. Any person who has obtained a Third Division at the M.Sc. Examination of this University shall be eligible to take the examination again under this Ordinance in the same subject or group of subjects as the case may be for improving his division. In such a case the provisions of Ordinance No.138 relating to Improvement of Division shall apply.

12.   (1) The scope of the subject shall be as indicated in the syllabus.
    (2) The medium of instruction and examination shall be English.

13. The number of papers and marks alloted to each subject and the minimum marks which an examinee must obtain in order to pass the examination shall be as indicated in Appendix-'A'

14. Examinees who are sucessful in the M.Sc. Semester-I, II, III & IV Examination and have obtained not less than 60% marks in the aggregate of the M.Sc. Semester-I, II, III & IV Examinations taken together shall be placed in the First Division, those obtained less than 60% but not less than 55% marks, in the Higher Second Division, those obtained less than 55% but not less than 48% marks, in the Second Division, and all other successful examinees, in the Third Division.

15. Provision of Ordinance No. 18 of 2001 relating to the an Ordinance to provide grace marks for passing in a Head of passing and improvement of division (higher class) and getting distinction in the subject and Condonation of Deficiency of Marks in a subject in all the faculty prescribed by the Statute No.18, Ordinance, 2001, shall apply to the examinations under this ordinance.

16. As soon as possible after the examination, but not later than 30th, June next following, the Management Council shall publish a list of successful examinees arranged in Three Divisions. The names of examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in each subject in the First or Second Division, shall be arranged in Order of Merit as provided in the Examinations in General Ordinance No.6.

17. Save as provided in Paragraph 11 of this ordinance, no person shall be admitted to an examination under this ordinance, if he has already passed the same examination of this University or an equivalent examination in M.Sc. Part-I (Semester-I & II), and M.Sc. Part-II (Semester-III & IV) of any other Statutory Univerisity.

18. Examinees successful at the M.Sc. Part-I (Semester-I & II), and M.Sc. Part-II (Semester-III & IV) shall on payment of the prescirbed fees, be entitled for the award of the respective Degree in the prescribed form, signed by the Vice-Chancellor.

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(Note : -   " P.G. Workload in the faculty shall be as per Ordinance

        No. 131.")

APPENDIX-A
SCHEME OF EXAMINATION FOR M.Sc. PART-I & II.
(FOR ALL SUBJECTS)

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i) M.Sc. Part-I	Paper-I	-	50 Marks	Practical-I	-	40 Marks
Semester-I	Paper-II	-	50 Marks	Internal Assessment	-	10 Marks
	Paper-III	-	50 Marks	Practical-II	-	40 Marks
	Paper-IV	-	50 Marks	Internal Assessment	-	10 Marks
M.Sc. Part-I	Paper-V	-	50 Marks	Practical-III	-	40 Marks
Semester-II	Paper-VI	-	50 Marks	Internal Assessment	-	10 Marks
	Paper-VII	-	50 Marks	Practical-IV	-	40 Marks
	Paper-VIII	-	50 Marks	Internal Assessment	-	10 Marks
M.Sc. Part-II	Paper-IX	-	50 Marks	Practical-V	-	40 Marks
Semester-III	Paper-X	-	50 Marks	Internal Assessment	-	10 Marks
	Paper-XI	-	50 Marks	Practical-VI	-	40 Marks
	Paper-XII	-	50 Marks	Internal Assessment	-	10 Marks
M.Sc. Part-II	Paper-XIII	-	50 Marks	Practical-VII	-	40 Marks
Semester-IV	Paper-XIV	-	50 Marks	Internal Assessment	-	10 Marks
	Paper-XV	-	50 Marks	Project Work	-	40 Marks
	Paper-XVI	-	50 Marks	Internal Assessment	-	10 Marks

ii) For the subject Mathematics, there shall be five theory papers of sixty marks for each semester.

Notes:-(1) Minimum pass marks for theory and practical examination including internal assessment shall be 36% separately.

(2) (a) Topic of project work shall be given by concerned supervisor with prior approval of Head of Department.
There shall be no duplication of the topic of the project work. Project shall be based on research in the laboratory
and / or field work. Project work shall be allotted at the beginning of third semester and the student shall have to
submit it atleast 15 days before commencement of practical examination of the fourth semester. Project work will be
evaluated by external and internal examiners.

(b) There should be atleast 2 to 3 external examiner for a batch of 10 students or 3 to 5 external examiner for a batch
more than 10 students.

(3) There shall be seperate exemption in theory and / or practical on getting minimum pass marks.

(4) Internal Assessment marks for all semesters shall be granted on the basis of - performance of students in any of the following activities:-
(i) Study tour, (ii) Seminar, (iii) field visits, (iv) Industrial visits, (v) visit to research institute / organisation.
(vi) Assignments, (vii) Unit test and any other co-curricular activities.

(5) The concerned Department or College shall have to maintain the record of award of internal assessment marks.

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DIRECTION

No. : 14 / 2009   Date : 29.6.2009

Subject : Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), Direction, 2009.

Whereas, Ordinance No.4 of 2008 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course) Ordinance, 2008 is in existance in the University.

AND

Whereas, the Board of Studies in Computer Science (including Computer Application and Computer Science (Computer Software)) in the faculty of Science in its meeting held on 5.6.2009 has resolved to accept revised syllabi of M.Sc. Semester-I to IV Computer Software, eligibility criteria and other details.

AND

Whereas, the Board of Studies further recommended that the scheme of examination will be applicable as per Ordinance No.4 of 2008 to M.Sc. Computer Software, as it is, and the revised syllabi shall be implemented from the academic session 2009-10 expeditiously in the light of advancement of knowledge in the subject.

AND

Whereas the Hon'ble Vice-Chancellor has accepted the revised syllabi of M.Sc. Computer Software, Eligibility criteria, Scheme of examinations and other details under section 14(7) of the Maharashtra Universities Act, 1994 on behalf of the faculty of Science and Academic Council.

AND

Whereas, Original Ordinance No.4 of 2008 is required to be amended for inclusion of the above said course.

AND

Whereas, the matter for the admission to student at the examination of above said course is required to be regulated by an Ordinance, and making amendments in Ordinance is time consuming process.

AND

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called "Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), Direction, 2009".

2. This direction shall come into force from the date of its issuance.

3. Eligibility criteria for admission to M.Sc. Computer Software shall be as given below.

   "A person who has passed the Degree of Bachelor of Science with Computer Science/Vocational Computer Application Subjects

   OR

   A person who has passed the Degree of Bachelor of Science with Post Graduate Diploma in Computer Science of this University

   OR

   An Examination Recognised as an equivalent of this University or of any other statutory University."

4. The Scheme of Examination for M.Sc. Computer Software shall be as per Ordinance No.4 of 2008 as other Science subjects, as it is.

Amravati   Sd/
Date : 29/6/2009   (Dr.Kamal Singh)
                                                   Vice-Chancellor

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DIRECTION

No. : 26 / 2010   Date : 24/06/2010

Subject : Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science, Direction, 2010.

Whereas, University Grants Commission, New Delhi vide D.O.No.F-2/2008/(XI Plan), Dtd.31 Jan.2008 regarding new initiatives under the 11th Plan – Academic Reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reform at the earliest.

AND

Whereas, the Academic Council while considering the above letter in its meeting held on 30.4.2008, vide item No.55 has resolved to refer the same to Dean's Committee, and the Dean's Committee in its meeting held on 19.07.2008 has decided to refer the matter to all Board of Studies.

AND

Whereas, the recommendations of various Board of Studies in the faculty of Science regarding Upgradation and Revision of various syllabi and introduction of choice based credit pattern Examination System at post graduate level was considered by the faculty of Science in its meeting held on 7.12.2009 and constituted a Committee of all Chairmen of Board of Studies and one member nominated by Chairmen of respective B.O.S. under the Chairmanship of Dean of faculty to decide the policy decision regarding choice based credit system examination pattern at P.G. level.

AND

Whereas, the faculty of Science in its emergent meeting held on 11th May, 2010 vide item No.27, has considered, accepted and recommended to Academic Council, the policy decision regarding introduction of Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science under ordinance No.4 of 2008. The recommendations of the faculty was approved by the Academic Council in its emergent meeting held on 28.5.2010, vide item No.36.

AND

Whereas, Ordinance No.4 of 2008 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) is in existence in the University as per semester pattern examination system.

AND

Whereas, it is necessary to frame the Regulation regarding the Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science which is to be implemented from the Academic Session 2010-11 of M.Sc.Semester-I & onwards to all subjects in the faculty of Science and framing of Regulation for the above examination is likely to take some time.

AND

Whereas, the admission of students in the above pattern at M.Sc. Part-I (Semester-I) of all subjects in the faculty of Science are to be made in the Academic Session 2010-11.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called "Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science, Direction, 2010.

2. This Direction shall come into force with effect from the examination as shown below for all subjects for the Examinations leading to the Degree of Master of Science in the faculty of Science-
    (i) Winter 2010 examination for M.Sc. Part-I, Semester-I,
    (ii) Summer-2011 examination for M.Sc. Part-I, Semester-II,
    (iii) Winter-2011 examination for M.Sc. Part-II, Semester-III,
    (iv) Summer-2012 examination for M.Sc. Part-II, Semester-IV.

3. The detailed Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate students in the Faculty of Science is as given below-

I. The CBCS System

All Programmes (named after the Core subject) mentioned in para 9 of Ordinance No.4 of 2008 shall be run on Choice Based Credit System (CBCS) and the grades in 7 point scale will be awarded to the students. It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

II. Credits and Degrees

i) A candidate who has successfully completed all the core courses Compulsory, Elective/ Specialised courses and project prescribed and optional approved by the University for the programme

and accumulated not less than 72 (52 core and elective) Credits and who has put in the minimum residence time shall be eligible to receive the degree.

ii) One Credit shall mean one teaching period per week for one semester (of 16 weeks) for theory courses and one laboratory session of two periods / week for one semester. One teaching period shall be of 60 minutes duration including 10 minutes for discussion / movement.

III. Courses

(i) **Core Course :-** A core course is a course that a student admitted to a particular programme must successfully complete to receive the degree. There may be two kinds of core courses: The **hard-core** courses which cannot be substituted by any other course and which must be successfully completed and **soft-core** courses which may be substituted by equivalent courses from the same department. In all P.G. programmes a project with 03 credits shall be included. The project may include a viva-voce examination with a credit of 1, Normally no theory course shall have more than 4 credits.

(ii) **Elective Course :** Means a optional course from the basic subject or specilization.

The core credits for any P.G. programme (inclusive of hard-core, soft-core and project) shall not exceed 60 credits and shall not be less than 48 credits. Each Board of Studies shall specify the core-credit load for their respective programme apart from approving syllabi,for all the courses offered by the department.

(iii) General Interest Course (GIC)

The General Interest Course shall be the choice of student. The student who choose the GIC shall have to register for it on payment of fees as prescribed by the University.

The Departmental Committee shall follow a selection procedure on a first come first served basis, fixing the maximum number of students, after counselling to the students etc. to avoid overcrowding to particular course(s) at the expense of some other courses.

(iv) Each **Course** is designed such that it includes lectures / tutorials / laboratory or field work / Seminar / Practical training / Assignments / Term paper / Report writing or review of literature and any other innovative practice etc., to meet effective teaching and learning needs.

(v) Attendance :- Students must have 75% of attendance in each Core and Elective course for appearing the examination. However student having attendance less than 75% may apply to the H.O.D. for condonation of attendance upto 15% under the provision of para 6-A (i) of Ordinance No.6.

IV. Registration for General Interest Course :-

i) Each student, on admission shall be assigned to a faculty advisor who shall advise the student about the academic programme and counsel him on the choice of courses listed in Appendix-Q depending on his general interest, academic background and objective.

ii) With the advice and consent of the faculty advisor the student shall register for courses he plans to take for the semester before classes start. No student shall be permitted to register for courses exceeding 30 credits per semester including those of repeat courses nor shall any student be permitted to register for any course without satisfactorily completing the prerequisites for the course except with the permission of the concerned teacher in the prescribed format.

iii) If the student feels he has registered for more courses than he can handle, he shall have the option of dropping one or more of the courses he has registered for, with the consent of his advisor before the end of 3rd week of the semester. However, a student, to retain his status, should have registered at least for core course and elective course of that semester.

iv) Students, other than those freshly admitted, shall register for the courses of their choice in the preceding semester by filling in the prescribed forms.

v) The University shall prescribe the maximum number of students in each General Interest Course taking into account the teachers and Physical facilities available in the Department.

vi) The University may make available to all students a listing of all the courses offered in every semester specifying the credits, the prerequisites, a brief description or list of topics the course intends to cover, the instructor who is giving the courses, the time and place of the classes for the course. This information shall be made available on the University website.

vii) Normally no course shall be offered unless a minimum of 10 students are registered.

viii) The student shall have to pay the prescribed fee per course for the registration.

V. Programme Committee :-

There shall be the programme committee at the University level constituted as under-

i) Dean of the faculty (Chairman)

ii) Heads of all the Departments – (Member)

iii) Three teachers from the affiliated colleges having post graduate courses other than University Department – nominated by the Vice-Chancellor. (Member)

iv) Deputy Registrar (Acad) – (Secretary)

Duties and responsibilities of the Programme Committee shall be as under-

i) To identify the General Interest Courses (GIC) as per the need of the student and availability of teachers in the Departments.

ii) To approve the time table of GIC and make it available to the students before the commencement of respective semester. This time table also be made available on the University website.

iii) To consider and approve the report of grivence redresal committee.

iv) To remove the difficulties if any faced during implementation of the CBCS and report it to Hon'ble Vice-Chancellor for further action.

v) Any other matter as it think fit for the effective implementation of CBCS.

VI. Departmental Committee

1. Every P.G. programme of the University/College shall be monitored by a committee constituted for this purpose by the Department.

   The Committee shall consist of H.O.D. as a Chairman and all the teachers of the Deptt. of its members including one student members per class. There shall be atleast one student member on the committee.

VII. Grievances Redressal Committee

The University or College shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD. This Committee shall solve all grievances relating to the Internal Assessment marks of the students.

VIII. Total credits per semester :-

Table-I
For all subjects other than Mathematics,
Biotechnology & Computer Science

Course	Credits				Total
	Sem-I	Sem-II	Sem-III	Sem-IV	
Core	12	12	12	12	48
Elective	04	04	04	04	16
GIC	00	04	04	04	12
Lab. Course	06	06	06	03	21
I.A.	04	04	04	04	16
Project	00	00	00	03	03
Total	26	26 or 30	26 or 30	26 or 30	116

Table-II
For Mathematics

Course	Credits				Total
	Sem-I	Sem-II	Sem-III	Sem-IV	
Core courses	12	12	12	12	48
Elective Courses	08	08	08	08	32
GIC	—	04	04	04	12
Internal Assessment	05	05	05	05	20
Project	—	—	—	04	04
Total	25	25 or 29	25 or 29	25 or 33	116

Table-III
For Biotechnology

Course	Credits				Total
	Sem-I	Sem-II	Sem-III	Sem-IV	
Core courses	16	12	12	08	48
Elective Courses	—	9	—	9	18
Lab courses	24	18	18	12	72
Seminar	—	01	01	—	02
Project				06	06
Assignment			02		02
Internal Assessment			02		02
Total	40	40	35	35	150

Table-IV
For Computer Science

Course	Credits				Total
	Sem-I	Sem-II	Sem-III	Sem-IV	
Core	25	20	15	10	70
Elective	-	05	05	05	15
GIC	-	-	05	-	05
Lab. Course	06	06	06	03	22
I.A.	-	-	-	02	02
Project	-	-	-	04/02	06
Total	31	31	31	26	119

IX. Grade Awards :-

(i) A seven point rating scale is used for the evaluation of the performance of the student to provide letter grade for each course and overall grade for the Master's Programme. Grade points are based on the total number of marks obtained by him/her in all the heads of examination of the course. These grade points and their equivalent range of marks are shown separately in Table-I. The performance of the student in theory, practical, internal assessment, subjects shall be evaluated in accordance with following Table-I.

TABLE –I

Grade	Range of Marks obtained out of 100 or Equivalent fraction	Grade Points	Remarks (Not to be displayed On transcripts)
O	90-100	10	Outstanding
A+	80-89	9	Excellent
A	70-79	8	Very Good
B+	60-69	7	Good
B	55-59	6	Fair
C+	50-54	5	Average
C	40-49	4	Below Average
F	Below 40	0	Fail

TABLE-II: Final Grade Points for SGPA and CGPA

Grade Points	Final Grade	Remarks (Not to be displayed On transcripts)
9.00-10.00	O	Outstanding
8.00 – 8.99	A+	Excellent
7.00-7.99	A	Very Good
6.00-6.99	B+	Good
5.50 – 5.99	B	Fair
5.00 – 5.49	C+	Average
4.00 – 4.99	C	Below Average

Equivalence of the conventional division/class with the CGPA is in accordance with the following table no. 4.

Table III. Equivalence of Class/Division to CGPA

Sr.No.	CGPA	Class/Division
1	8.00 or more	First Class – Exemplary
2	7.50 or more but less than 8.00	First Class with Distinction
3	6.00 or more but less than 7.49	First Class
4	5.50 or more but less than 5.99	Higher Second Class
5	4.00 or more but less than 5.49	Second Class
6	Less than 4.00	Fail

The overall performance of a student is evaluated by assigning appropriate weightage to all the *four* semesters in order to maintain the quality of education. A student is permitted to appear for the semester examination subject to he or she has a minimum attendance of 75% in theory and practical classes, completes all his/her internal/ sessional assignments and clears all his/her dues. Non appearance in any examination is treated as the student having secured zero mark in that subject examination.

The evaluation is based on an average weightage system. Every subject has credit points based on the hours of study required. Every student is assessed in a subject with appropriate weightage to internal/ sessional work and semester examination, thereby making the students study regularly. Every student is awarded Grade points out of maximum 10 points in each subject (based on 7 Points Scale). Based on the Grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed.

X. Computation of SGPA & CGPA

Every student will be awarded points out of maximum 10 points in each subject. (based on 7 Points Scale). Based on the Grade points obtained in each subject the Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed. The computation of SGPA & CGPA, is as under:

Semester Grade Point Average (SGPA) is the weighted average of points obtained by a student in a semester and is computed as follows:

$$SGPA = \frac{U1 \times M1 + U2 \times M2 + ... + Un + Mn}{U1 + U2 + ...Un}$$

Where U1, U2, ….. are subject credit of the respective course and M1, M2, ….. are the Grade Points obtained in the respective subject (out of 10)

The Semester Grade Point Average (SGPA) for all the four semesters is also mentioned at the end of every semester.

The Cumulative Grade Point Average (CGPA) is used to describe the overall performance of a student in the course and is computed as under:

$$CGPA = \frac{\sum\limits_{n=1}^{4} SGPA(n) C_n}{\sum\limits_{n=1}^{n=4} C_n}$$

Where SGPA (n) is the nth Semester SGPA of the student and C_{-n} is the nth Semester total credit. The SGPA and CGPA are rounded off to the second place of decimal.

XI. Internal Evaluation Method :-
(i) At the beginning of each course, every teacher shall inform his/her students unambiguously the method he/she proposes to adopt for the continuous assessment. Normally the teacher concerned may conduct three written sessional examinations spread periodically during the semester and select best two for contributing to the final marks.
(ii) At the end of each semester the Departmental Committee shall assign grades to the students.
(iii) The Departmental Committee shall prepare the copies of the result sheet in duplicate.

(iv) Every student shall have the right to scrutinize answer scripts of sessional/end-semester examinations and seek clarifications from the teacher regarding eveluation of the scripts immediately thereafter or within 3 days of receiving the evaluated scripts.

(v) The Department shall display the grade points and grades for the notice of students.

(vi) The department shall send all records of evaluation, including sessional evaluation, for safekeeping to the Controller of Examinations as soon as all the formalities are over.

XII. Grade Card

The University shall issue at the beginning of each semester a grade card for the student, containing the grades obtained by the student in the previous semester and his Semester Grade Point Average (SGPA).

The grade card shall list:

(a) the title of the courses along with code taken by the student

(b) the credits associated with the course,

(c) the grade and grade points secured by the student,

(d) the total credits earned by the student in that semester.

(e) the SGPA of the student,

(f) the total credits earned by the students till that semester and

(g) the CGPA of the student (At the end of the IVth Semester)

XIII. At the end of the IVth semester, the University shall issue the statement of marks to the Students showing details of marks obtained by the student in each Head in each semester along with grade total marks.

XIV. Power to modify and remove difficulties :-

1. Not withstanding anything contained in the foregoing, Hon'ble V.C. in consultation with the Dean of the faculty shall have the power to issue directions or orders to remove any difficulty,

2. Nothing in the foregoing may be construed as limiting the power of the University to amend, modify or repeal any all of the above.

sd/-

Amravati   (Dr.Kamal Singh)

Date : 2/6/2010   Vice-Chancellor

Examination Scheme under C.B.C.S. for the subject other than Mathematics, Biotechnology and Computer Science in the faculty of Science
M.Sc. Part-I
Semester-I

SA-Subject abbrivation; C-Core; E-Elective

			Theory				Practical		
Sr.No.	Paper / Code	Course	Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)	Max. Marks (Credit)	Min. Marks marks (Min. Grade Point)
1	2	3	4	5	6	7	8	9	10
1	1SA-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
2	1SA-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
3	1SA-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
4	1SA-4	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
5	1SA-5	Lab-I	—	—	—	—	—	100 (03)	40 (04)
6	1SA-6	Lab-II	—	—	—	—	—	100 (03)	40 (04)

Total Marks : 600; Minimum Total Credits : 26

Note :- (1) If the student has scored minimum marks or minimum grade points mentioned in Column No.8 out of the sum of total marks of theory and internal assessment taken together then he/she will be declared to have cleared with (04+01) 05 credits.

(2) If the student has scored minimum marks or minimum grade points in either theory or in internal assessment then he/she will be declared to have cleared in that particular head.

Examination Scheme under C.B.C.S. for the subject other than Mathematics, Biotechnology and Computer Science in the faculty of Science
M.Sc. Part-I
Semester-II

SA-Subject abbrivation; C-Core; E-Elective; GIC-General Interest Course

Sr.No.	Paper / Code	Course	Theory				Practical		
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)	Max. Marks (Credit)	Min. Marks marks (Min. Grade Point)
1	2	3	4	5	6	7	8	9	10
1	2SA-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
2	2SA-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
3	2SA-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
4	2SA-4 Or 2GIC-X	E and/or GIC	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
5	2SA-5	Lab-III	—	—	—	—	—	100 (03)	40 (04)
6	2SA-6	Lab-IV	—	—	—	—	—	100 (03)	40 (04)

Total Marks : 600; Minimum Total Credits : 26

Note :- (1) If the student has scored minimum marks or minimum grade points mentioned in Column No.8 out of the sum of total marks of theory and internal assessment taken together then he/she will be declared to have cleared with (04+01) 05 credits.

(2) If the student has scored minimum marks or minimum grade points in either theory or in internal assessment then he/she will be declared to have cleared in that particular head.

Examination Scheme under C.B.C.S. for the subject other than Mathematics, Biotechnology and Computer Science in the faculty of Science
M.Sc. Part-II
Semester-III

SA-Subject abbrivation; C-Core; E-Elective; GIC-General Interest Course

Sr.No.	Paper / Code	Course	Theory				Practical		
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)	Max. Marks (Credit)	Min. Marks marks (Min. Grade Point)
1	2	3	4	5	6	7	8	9	10
1	3SA-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
2	3SA-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
3	3SA-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
4	3SA-4 Or 3GIC-Y	E and/or GIC	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
5	3SA-5	Lab-V	—	—	—	—	—	100 (03)	40 (04)
6	3SA-6	Lab-VI	—	—	—	—	—	100 (03)	40 (04)

Total Marks : 600; Minimum Total Credits : 26

Note :- (1) If the student has scored minimum marks or minimum grade points mentioned in Column No.8 out of the sum of total marks of theory and internal assessment taken together then he/she will be declared to have cleared that (04+01) 05 credits.

(2) If the student has scored minimum marks or minimum grade points in either theory or in internal assessment then he/she will be declared to have cleared in that particular head.

Appendix-D

Examination Scheme under C.B.C.S. for the subject other than Mathematics, Biotechnology and Computer Science in the faculty of Science

M.Sc. Part-II
Semester-IV

SA-Subject abbrivation; C-Core; E-Elective; GIC-General Interest Course

| Sr.No. | Paper / Code | Course | Theory | | | | | Practical | |
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)	Max. Marks (Credit)	Min. Marks marks (Min. Grade Point)
1	2	3	4	5	6	7	8	9	10
1	4SA-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
2	4SA-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
3	4SA-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
4	4SA-4 Or 4GIC-Z	E and/or GIC	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)	—	—
5	4SA-5	Lab-V	—	—	—	—	—	100 (03)	40 (04)
6	4SA-6	Project	—	—	—	—	—	100 (03)	40 (04)

Total Marks : 600;   Minimum Total Credits : 26

Note :- (1) If the student score Minimum Marks or Minimum Grade Points mentioned in Column No.8 out of the sum total marks of theory and internal assessment taken together then he/she will be declared to have clear (04+01) 05 credits.

(2) If the student score Minimum Marks or Minimum Grade Points in either theory or in internal assessment then he/she will be declared to have clear in that Particular Head.

Appendix-E

Examination Scheme under C.B.C.S. for the subject Mathematics in the faculty of Science

M.Sc. Part-I
Semester-I

| Sr.No. | Paper / Code | Course | Theory | | | | |
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)
1	2	3	4	5	6	7	8
1	1MTH-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
2	1MTH-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
3	1MTH-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
4	1MTH-4	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
5	1MTH-5	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
			400 (20)		100 (05)		

Total Marks : 500;   Total Credits : 25

Note :- (1) If the student score Minimum Marks or Minimum Grade Points mentioned in Column No.8 out of the sum total marks of theory and internal assessment taken together then he/she will be declared to have clear (04+01) 05 credits.

(2) If the student score Minimum Marks or Minimum Grade Points in either theory or internal assessment then he/she will be declared to have clear either of the head.

Examination Scheme under C.B.C.S. for the subject Mathematics in the faculty of Science

M.Sc. Part-I
Semester-II

Sr.No.	Paper / Code	Course	Theory				
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)
1	2	3	4	5	6	7	8
1	2MTH-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
2	2MTH-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
3	2MTH-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
4	2MTH-4	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
5	2MTH-5 and/or 2GIC-X	E and/or GIC	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
			400 (20)		100 (05)		

Total Marks : 500;   Total Credits : 25

Note :- (1) If the student score Minimum Marks or Minimum Grade Points mentioned in Column No.8 out of the sum total marks of theory and internal assessment taken together then he/she will be declared to have clear (04+01) 05 credits.

(2) If the student score Minimum Marks or Minimum Grade Points in either theory or internal assessment then he/she will be declared to have clear either of the head.

Examination Scheme under C.B.C.S. for the subject Mathematics in the faculty of Science

M.Sc. Part-II
Semester-III

Sr.No.	Paper / Code	Course	Theory				
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)
1	2	3	4	5	6	7	8
1	3MTH-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
2	3MTH-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
3	3MTH-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
4	3MTH-4	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
5	3MTH-5 and/or 3GIC-Y	E and/or GIC	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
			400 (20)		100 (05)		

Total Marks : 500;   Min. Total Credits : 25

Note :- (1) If the student score Minimum Marks or Minimum Grade Points mentioned in Column No.8 out of the sum total marks of theory and internal assessment taken together then he/she will be declared to have clear (04+01) 05 credits.

(2) If the student score Minimum Marks or Minimum Grade Points in either theory or internal assessment then he/she will be declared to have clear either of the head.

Examination Scheme under C.B.C.S. for the subject
Mathematics in the faculty of Science

M.Sc. Part-I
Semester-IV

Sr.No.	Paper / Code	Course	Theory				
			Max. Marks (Credits)	Min Pass Marks (Min. Grade Pt.)	Int. Ass. (Credits)	Min. Pass Marks (Min. Grade Pt.)	Th + Int. Ass. Min.Pass Mar (Grade Pt.)
1	2	3	4	5	6	7	8
1	4MTH-1	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
2	4MTH-2	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
3	4MTH-3	C	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
4	4MTH-4	E	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
5	4MTH-5 and/or 4GIC-Z and/or Project	E and/or GIC and/or Project	80 (04)	32 (04)	20 (01)	08 (04)	40 (04)
			400 (20)		100 (05)		

Total Marks : 500;   Min.Total Credits : 25

Note :- (1) If the student score Minimum Marks or Minimum Grade Points mentioned in Column No.8 out of the sum total marks of theory and internal assessment taken together then he/she will be declared to have clear (04+01) 05 credits.

(2) If the student score Minimum Marks or Minimum Grade Points in either theory or internal assessment then he/she will be declared to have clear either of the head.

Appendix-I

Scheme of Teaching and Examination under C.B.C.S. for the Subject Biotechnology
M.Sc. (Biotechnology) SEMESTER PATTERN
M.Sc.Part-I (SEMESTER-I)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/ Week		Credits		Examination Scheme								
								Theory					Practical			
								Paper Hrs	Max External; Marks	Max Internal Marks	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
				T	P/ TU	Theory	Pract.									
1	1BTB-1	I	C	04	06	04		3	100		100	4	--	--	--	--
2	1BTB-2	II	C	04	06	04		3	100		100	4	--	--	--	--
3	1BTB-3	III	C	04	06	04		3	100		100	4	--	--	--	--
4	1BTB-4	IV	C	04	06	04		3	100		100	4	--	--	--	--
5	1BTB-5	Lab-I		--	P 01		12	--	--	--	--	-	80	20	100	5
6	1BTB-6	Lab-II		--	P 02		12	--	--	--	--	--	80	20	100	5
				16	24	16	24				400				200	

Total Credits: 40

Appendix-J

Scheme of Teaching and Examination under C.B.C.S. for the Subject Biotechnology
M.Sc. (Biotechnology) SEMESTER PATTERN
M.Sc.Part-I (SEMESTER-II)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/ Week		Credits		Examination Scheme								
								Theory					Practical			
								Paper Hrs	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
				T	P/ TU	Theory	Practical									
1	2BTB-1	V	C	04	06	4		3	100		100	4	--	--	--	--
2	2BTB-2	VI	C	04	06	4		3	100		100	4	--	--	--	--
3	2BTB-3	VII	C	04	06	4		3	100		100	4	--	--	--	--
4	2BTB-4 and/or 2GIC-X	VIII	E and/or GIC	04	06	4		3		100	100	4	--	--	--	--
5	2BTB-5	Lab-III			P 02		12	--	--	--	--	--	80	20	100	5
6	2BTB-6	Lab-IV			P 02		12	--	--	--	--	--	80	20	100	5
		Total		16	25	16	24				400				200	

Total Credits: 40

Appendix-K

Scheme of Teaching and Examination under C.B.C.S. for the Subject Biotechnology
M.Sc. (Biotechnology) SEMESTER PATTERN
M.Sc.Part-II (SEMESTER-III)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/ Week		Credits		Examination Scheme								
								Theory					Practical			
				T	P/ TU	Theory	Pract.	Paper Hrs.	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	3BTB-1	IX	C	04	06	04		3	100	--	100	4	--	--	--	--
2	3BTB-2	X	C	04	06	04		3	100	--	100	4	--	--	--	--
3	3BTB-3 and 3GIC-Y	XI and 3GIC-Y	C and GIC	04	06	04		3	100	--	100	4	--	--	--	--
4	3BTB-4	Lab-V			P 02		18	--	--	--	--	--	80	20	100	5
5	3BTB-5	Internal Assessment			01		02		--	--	--	--	--	75	75	5
6	3BTB-6	Assignment					02		--	--	--	--	--	50	50	5
7		Seminar			01	1		-	--	--	--	--		75	75	5
		Total		12	20	13	22	-	--	--	300	--	--	--	300	--

Total Credits: 35

Appendix-L

Scheme of Teaching and Examination under C.B.C.S. for the Subject Biotechnology
M.Sc. (Biotechnology) SEMESTER PATTERN
M.Sc.Part-II (SEMESTER-IV)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/ Week		Credits		Examination Scheme								
								Theory					Practical			
				T	P/ TU	Theory	Pract.	Paper Hrs.	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	4BTB-1	XII	C	04	06	04		3	100	--	100	4	--	--	--	--
2	4BTB-2	XIII	C	04	06	04		3	100	--	100	4	--	--	--	--
3	4BTB-3 and/or 4GIC-Z	XIV	E and/or GIC	04	06	04		3		100	100	4	--	--	--	--
4	4BTB-4	Lab-VI					18						80	20	100	5
5	4BTB-5	Project			06		06						200	--	200	5
		Total		12	24	12	24	-	--	--	300	--	--	--	300	--

Total Credits: 35

Appendix-M

Scheme of Teaching and Examination under C.B.C.S. for the subject Computer Science
M.Sc. (Computer) SEMESTER PATTERN
M.Sc.Part-I (SEMESTER-I)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C.   General Interest Course, C-Core

S N	Subject Code	Paper	Course	Hrs/Week		Credits		Examination Scheme								
								Theory					Practical			
				T	P/TU	Theory	Practical	Paper Hrs	Max External; Marks	Max Internal Marks	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	1MCS-1	I	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
2	1MCS-2	II	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
3	1MCS-3	III	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
4	1MCS-4	IV	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
5	1MCS-5	V	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
6	1MCS-6	Lab-I	-	-	7	-	03			-						
7	1MCS-7	Lab-II	-	-	7	-	03			-			100	-	100	40 4.0
		Total		25	14	25	06						100	-	100	40 4.0

Total Credits: 40

Appendix-N

Scheme of Teaching and Examination under C.B.C.S. for the subject Computer Science
M.Sc. (Computer) SEMESTER PATTERN
M.Sc.Part-I (SEMESTER-II)

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course, C-Core

S N	Subject Code	Paper	Course	Hrs/Week		Credits		Examination Scheme								
								Theory					Practical			
				T	P/TU	Theory	Practical	Paper Hrs	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	2MCS-1	VI	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
2	2MCS-2	VII	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
3	2MCS-3	VIII	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
4	2MCS-4	IX	C	5	-	5	-	3 Hrs	100	-	100	40	4.00				
5	2MCS-5 Or 2GIC-X	X	E or GIC	5	-	5	-	3 Hrs	100	-	100	40	4.00				
6	2MCS-6	Lab-III	-	-	7	-	03	-	-	-	-					
7	2MCS-7	Lab-IV	-	-	7	-	03	-	-	-	-		100	-	100	40 4.0
				25	14	25	06						100	-	100	40 4.0

Total Credits: 40

Scheme of Teaching and Examination under C.B.C.S. for the subject Computer Science
M.Sc. (Computer) SEMESTER PATTERN
M.Sc.Part-II (SEMESTER-III)

Appendix-O

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/Week		Credits		Examination Scheme									
								Theory					Practical				
				T	P/TU	Theory	Pract.	Paper Hrs.	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	3MCS-1	XI	C	5	-	5	-	3 Hrs	100	-	100	40 4.00				
2	3MCS-2	XII	C	5	-	5	-	3 Hrs	100	-	100	40 4.00				
3	3MCS-3	XIII	C	5	-	5	-	3 Hrs	100	-	100	40 4.00				
4	3MCS-4	XIV	E	5	-	5	-	3 Hrs	100	-	100	40 4.00				
5	3MCS-5 Or 3GIC-Y	XV	E or GIC	5	-	5	-	3 Hrs	100	-	100	40 4.00				
6	3MCS-6	Lab-V	-	-	7	-	03			-						
7	3MCS-7	Lab-VI	-	-	7	-	03			-			100	-	100	40 4.0
		Total		25	14	25	06						100	-	100	40 4.0

Total Credits: 35

Scheme of Teaching and Examination under C.B.C.S. for the subject Computer Science
M.Sc. (Computer) SEMESTER PATTERN
M.Sc.Part-II (SEMESTER-IV)

Appendix-P

T: Lectures, P: Practical, TU: Tutorial/Assignment; G.I.C. – General Interest Course

S N	Subject Code	Paper	Course	Hrs/Week		Credits		Examination Scheme									
								Theory					Practical				
				T	P/TU	Theory	Pract.	Paper Hrs.	Max Theory	Max Internal	Total	Min Passing Grade Points	Max Marks Practical	Max Marks Int. Ass	Total	Min Passing Grade Points
1	4MCS-1	XVI	C	5	-	5	-	3 Hrs	100	-	100	40 4.00				
2	4MCS-2	XVII	C	5	-	5	-	3 Hrs	100	-	100	40 4.00				
3	4MCS-3 Or 4GIC-Z	XVIII	E or GIC	5	-	5	-	3 Hrs	100	-	100	40 4.00				
4	4MCS-4	Lab-VII	-	-	7	-	03	4 Hrs	-	-	-	-	100		100	40 04
5	4MCS-5	Project	-	-	7	-	03+1			-	-	-	100	50	100	40 04
6	4MCS-6	Seminar	-	02	-	-	01+1			-	-	-	100	50	150	60 04
7	4MCS-7	Internal Assessement	-	06	-	-	02		-	-	-	40 4.00		50	50	20 04
		Total		23	14	15	11									

Total Credits: 35

Appendix-Q

List of General Interest Courses (GIC) to be opted

by the student/s in Semester-II

Sr.No.	Subject	Subject Code Elective	Equivalent General Interest Course Code
1	2	3	4
1	Chemistry	2CHE3	2GIC-1
		2CHE4	2GIC-2
2	Physics	2PHY3	2GIC3
		2PHY4	2GIC4
3	Mathematics	2MTH4	2GIC5
		2MTH5	2GIC6
4	Zoology	2ZOO3	2GIC7
		2ZOO4	2GIC8
5	Botany	2BOT3	2GIC9
		2BOT4	2GIC-A
6	Statistics	2SCA3	2GIC-B
		2SCA4	2GIC-C
7	Biotechnology	2BTB3	2GIC-D
		2BTB4	2GIC-E
8	Computer Science	2CMS3	2GIC-F
		2CMS4	2GIC-G
9	Microbiology	2MCB3	2GIC-H
		2MCB4	2GIC-I
10	Electronics	2ELE3	2GIC-J
		2ELE4	2GIC-K
11	Biochemistry	2BMC3	2GIC-L
		2BMC4	2GIC-M
12	Geology	2GEO3	2GIC-N
		2GEO4	2GIC-O
13	Bioinformatics	2BIT3	2GIC-P
		2BIT4	2GIC-Q
14	Environmental Science	2ENV3	2GIC-R
		2ENV4	2GIC-S
15	Geoinformatics	2GIT3	2GIC-U
		2GIT4	2GIC-V
16	Computer Software	2CSW3	2GIC-W
		2CSW4	2GIC-1A
17	Remote Sensing and GIS	2RSG3	2GIC-1B
		2RSG4	2GIC-1C
18	Pharmaceutical Chemistry	2PCH3	2GIC-1D
		2PCH4	2GIC-1E

Note : Title of the paper shall prescribed in the respective prospectuses.

DIRECTION

No. : 27 / 2010   Date : 24.6.2010

Subject : Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), Direction, 2010.

Whereas, Ordinance No.4 of 2008 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course) Ordinance, 2008 is in existance in the University.

AND

Whereas, the Academic Council in its meeting held on 28.5.2010 vide item No.36 has approved the policy decision regarding introduction of Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science, for all subjects along with Draft Regulation in this behalf.

AND

Whereas, due to implementation of Scheme for Choice Based Credit System (CBCS) and Awarding Grades to the Post Graduate Students in the Faculty of Science, the provision under Ordinance No.4 of 2008 need to be revised accordingly.

AND

Whereas, admission to students for M.Sc. Part-I (Semester-I) for all subjects in the faculty of Science are to be made in the Academic Session 2010-11 in choice based credit system (C.B.C.S.).

AND

Whereas, making amendments in Original Ordinance No.4 of 2008 is likely to take some time.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called "Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), Direction, 2010".

2. This direction shall come into force from the date of its issuance.

3. The word "or Biochemistry" in clause i) of sub-para (i) of para 5 shall be deleted.

4. The title of the subject "Electronics (Instrumentation)" be substituted as "Electronics" wherever occur in the Ordinance.

5. Following shall be the eligibility criteria for admission to M.Sc. Part-I Semester-I for the subjects – (i) Pharmaceutical Chemistry, (ii) Biotechnology, (iii) Computer Science.

(a) for admission to M.Sc. Pharmaceutical Chemistry a candidate shall have offered Chemistry or Industrial Chemistry or Biochemistry as a subject of study and examination at the B.Sc. Degree.

(b) following shall be the eligibility for admission to M.Sc. Semester-I (Biotechnology) -

(i) B.Sc. in any discipline of Life Sciences, Bio Sciences or Bachelor's Degree in Agriculture, Veternary and fishery Sciences, Pharmacy, or Bachelor of Medicine and Bachelor of Surgery (M.B.B.S.) or Bachelor of Dental Surgery or equivalent examination recognized by Sant Gadge Baba Amravati University are eligible to appear in entrance test as given in para (iii) below.

(ii) The student should have minimum 50% marks as aggregate in the degree course.

(iii) The student will have to pass entrance examination for admission in M.Sc. Semester-I (Biotechnology) as per the Sant Gadge Baba Amravati University rules.

(c) following shall be the eligibility for admission to M.Sc. Semester-I (Computer Science) -

    i. A person who has passed the Degree of Bachelor of Science of this university with Computer Science / Computer Application (Vocational) as on the subjects.

<div align="center">OR</div>

    ii. A person who has passed B.A. / B.Sc. with Mathematics plus Post Graduate Diploma in Computer Science of this University.

<div align="center">OR</div>

    iii. A person who has passed a Degree of Bachelor of Computer Science.

6. The following subject be inserted in para 9) of the Ordinance after Sr.No. "15. Bioinformatics".

"16. Computer Software,

17. Computer Science

18. Biotechnology, and

19. Pharmaceutical Chemistry.

7. A person who desire to improve the division obtained by him/her at M.Sc. examination shall be eligible for improvement of division under the provision of Ordinance No.6 of 2008. However, for improvement of division he/she shall have to offer the core courses only. In no case he/she shall be allowed for improvement of division/grade/CGPA by offering General Interest Course.

8. The number of papers and marks allotted to each subject and the minimum marks which an examinee must obtained in order to pass the examination shall be as indicated in Appendices, appended with the Regulation.

9. The classification in reference to the class/division/grade to be awarded to the examinee shall be as per the Table-III (Equivalence to Class / Division to CGPA) of para No.IX, appended to the Regulation.

10. As soon as possible after the examination, but not later than 30th, June following, the B.O.E. shall publish a list of successful examinees arranged in Division as mentioned in Table-III (Equivalence to Class / Division to CGPA) of para No.IX, appended to the Regulation. The names of examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in each subject in the division as per Table-III of the Regulation shall be arranged in order of merit as provided in the Examinations in General Ordinance No.6.

Sd/-

Amravati   (Dr.Kamal Singh)

Date : 21/6/2010   Vice-Chancellor

<div align="center">*****</div>

DIRECTION

No. :39/ 2011   Date :23.8.2011

Subject : Corrigendum to Direction No. 26/2010

Whereas, the Direction No.26 of 2010 in respect of Scheme of Choice Based Credit System (CBCS) and awarding Grades to the Post Graduate students in the faculty of Science is in existence.

AND

Whereas, the Academic Council in its emergent meeting held on 28.5.2010 vide item No.36 has approved the decision regarding introduction of scheme for C.B.C.S. and Awarding grades to the P.G. students in the faculty of Science under Ordinance No.4 of 2008..

AND

Whereas, in sub-para V of para 3, under Direction No.26 of 2010, there shall be Programme Committee and the duties of the Programme Committee shall be to remove the difficulties if any faced during implementation of C.B.C.S. and report it to Hon'ble Vice-Chancellor for further action and any other matter as it think fit for the effective implementation of C.B.C.S.

AND

Whereas, the Programme Committee in its meetings held on 14.7.2011, 20.7.2011, 30.7.2011 & 9.8.2011 has recommended necessary corrections in the above Direction which will be effective from the academic session 2011-12. The minutes of the Programme Committee was accepted by Hon'ble Vice-Chancellor on dated 22.8.2011.

AND

Whereas, it is necessary to carry out the corrections in the above said Direction immediately.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called "Corrigendum to Direction No.26/2010.
2. This direction shall come into force from the date of its issuance.
3. (A) In Direction No.26/2010 in respect of Scheme of Choice Based Credit System (CBCS) and awarding Grades to the Post Graduate students in the faculty of Science following paras be corrected as follows :

i) In para II, sub para (i) of para 3 in the fifth line after the words 'less than' the figure, sign, and words '72 (52 core and elective)' be substituted by the figures, sign, and words '88(64 core and elective)'

ii) In para VI: the title "Departmental Committee" be replaced as "Programme Monitoring" and Para 1 be completely deleted. Instead of this, the new para should be "Every P.G. programme of the University/College shall be monitored by the Head of the Department of the University/College of the concerned subject."

iii) The para VII shall be substituted as given below -
"VII. Grievance Redressal
All the grievances regarding Internal Assessment shall be settled by H.O.D. or the teacher of the department nominated by H.O.D. / Principal".

iv) In para IX : Table I: the grades in column No.2 shall be substituted as under -

"O	by	AA
A⁺	by	AB
A	by	BB
B⁺	by	BC
B	by	CC
C⁺	by	CD
C	by	DD"

v) **In para X :**
   i) In the first line the word 'Grade' be added after the word 'awarded' and before the word 'points'.
   ii) In third line the words 'obtained in each subject' be substituted by the words 'obtained in Core and Elective courses of the subject'

vi) **In para XI :**
   - In sub para (i) in the first line the word "Head of the Department' be inserted after the words & sign "each course," and before the words "every teacher".
   - The sentence "Normally the teacher concerned may conduct three written sessional examinations spread periodically during the semester and select best two for contributing to the final marks" shall be deleted.
   - Sub para (ii) & (iii) be deleted completely.

- Sub para (iv) be renumbered as sub para (ii) and the word "teacher" in the second line of the original sub para (iv) be substituted by the words "Head of Departments".
- Sub para (v) be renumbered as sub para (iii). In original sub para (v) the words "grade points and grades" be deleted.
- Sub para (vi) be deleted completely.

vii) The word 'Minimum' printed below the table in Appendix A, B, C, D, G, and H, shall be deleted.

viii) Following special explanatory Note be added below the table in Appendix-D, H, L, and P respectively.

"**Special Explanatory Note** :- At the end of IVth semester, the students/examinee who accumulated atleast 88 credits (out of these 88 credits, 64 credits must be on core and elective course) and who has put in the minimum residence time shall be eligible to receive the degree in the subject he/she has admitted".

(B) The students should have accumulated 28 credits of M.Sc. Part-I, Sem-I & II taken together for admission to III Semester and should have completed the term of M.Sc. Part-I (Semester-I & II) satisfactorily.

<div align="center">Sd/-</div>

Amravati   (Mohan K.Khedkar)

Date : 22/8/2011   Vice-Chancellor

<div align="center">*****</div>

DIRECTION

No. : 25 / 2012   Date : 29/6/2012

Subject : Corrigendum to Direction No.26/2010 and 39/2011

Whereas, the Direction No.26 of 2010 in respect of Scheme of Choice Based System (CBCS) and awarding Grades to the Post Graduate Students in the faculty of Science is in existence.

<div align="center">AND</div>

Whereas, University has issued corrigendum to Direction No.26 of 2010 vide Direction No.39 of 2011 on dated 23.8.2011.

<div align="center">AND</div>

Whereas, in sub-para V of para 3, under Direction No.26 of 2010, there shall be Programme Committee and the duties of the Programme Committee shall be to remove the difficulties if any faced during implementation of C.B.C.S. and report it to Hon'ble Vice-Chancellor for further action and any other matter as it think fit for the effective implementation of C.B.C.S.

<div align="center">AND</div>

Whereas, the Programme Committee in its meeting held on 1st March, 2012 and 18th April 2012 has recommended necessary corrections in the above said Directions which shall be effective for 2011-12 session and the minutes of the Programme Committee was accepted by the Hon'ble Vice-Chancellor.

<div align="center">AND</div>

Whereas, the Academic Council in its meeting held on 13.1.2012, vide item No.14(5) F) R-3, I) R-2 & R6 has accepted additional eligibility criteria for Admission to M.Sc. (Zoology), Direct admission to M.Sc. Part-II (Computer Science) for the students who have passed the degree of M.Sc. (Computer Software), and revised syllabi of M.Sc. (Computer Science), which is to be implemented from the Academic Session 2012-13.

<div align="center">AND</div>

Whereas, it is necessary for carryout the corrections in the above said Direction immediately.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called " Corrigendum to Direction No.26/2010 and 39/2011".

2. This direction shall come into force from the date of its issuance.

3. In Direction No.26/2010 in respect of Scheme of Choice Based System (CBCS) and awarding Grades to the Post Graduate Students in the faculty of Science, following corrections shall be carried out-

   A) i) In para 5th , the words and brackets "Degree of विज्ञान स्नातक (Bachelor of Science)" shall be substituted as "Degree of विज्ञान पारंगत (Master of Science)"

   ii) The clause (i), of sub-para (II) of para 3 shall be deleted.

   iii) The clause (i), of sub-para (II) of para 3 shall be renumbered as para ("i") and new para (ii) shall be added as follows.

   "Minimum total credits that students shall have to accumulate in all four semesters for receiving the M.Sc. degree core subject shall be as shown in the table given as under –

Subject/s	Minimum total credits (Core Elective and GIC)
All subjects other than Mathematics, Computer Science & Biotechnology	104
Computer Science	119
Biotechnology	150
Mathematics	100

   B) i) Under Table-III (Equivalence of Class/Division of CGPA) of Para IX,

   (a) the figures shown '7.49', '5.99', and '5.49' against Sr.Nos.3, 4 & 5 in Column No.2 (CGPA) be substituted by the figures '7.50', '6.00', and '5.50' respectively.

   (b) Following sub-para be added before the para 'X'.

   "**Declearation of Merit List** :- Merit list of M.Sc. (C.B.C.S.) examination shall be prepared from the examinee who have successively cleared minimum total credits including GIC as shown in the table assigned in the first attempt.

   ii) Special Explanatory note shown under Appendix-D, H, I, L and P shall be deleted.

   The note No.(2) printed under Appendix-A, B, C, D, E, F & H shall be substituted as follows-

   "If the student has not scored minimum marks or minimum grade points mentioned in column No. 8 and if the student scores minimum marks or minimum grade points in either theory or internal assessment then he/she will be declared to have cleared either of the head".

4. In Direction No.39 of 2011, under para IX), in Table-I & II, under column No.2, i.e. "Grade Points" and "Final Grade" shall be substituted respectively as under.

"O	by	AA
A+	by	AB
A	by	BB
B+	by	BC
B	by	CC
C+	by	CD
C	by	DD"

5. As the revised syllabi has been accepted by the Academic Council, for the subject Computer Science of four theory papers to each semester therefore the Scheme of Examination for M.Sc. Semester-I to IV shall be as per Appendices-A, B, C & D appended to Direction No.26 of 2010, which is to be implemented for Semester-I from Winter-2012, Semester-II from Summer-2013, Semester-III from Winter-2013 & Semester-IV from Summer-2014 respectively.

6. The students passing B.Sc. Agriculture with specialization Antomology and Fisheries shall be eligible for admission to M.Sc. Zoology with specialization Antomology and Fisheries respectively.

7. The student having Degree of M.Sc. (Computer Software) shall be eligible for directly admission to M.Sc. Part II (Semester III) (Computer Science) in the faculty of science within the jurisdiction of sant Gadge Baba Amravati University, Amravati. The average percentage of Marks of M.Sc. (Computer software) and percentage of marks of M.Sc. (Computer Science) shall be considered to award class / Grade for awarding the degree of M.Sc. (Computer Science).

Sd/-
Amravati   (Mohan K.Khedkar)
Date : 28/6/2012   Vice-Chancellor

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SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION

No. : 7 of 2014   Date: 07/05/2014

Subject : Corrigendum to Direction No.25 of 2012

Whereas, Direction No.25 of 2012 in respect of Corrigendum to Direction No.26/2010 and 39/2011 in the Faculty of Science is in existence in the University.

AND

Whereas, the Academic Council in its meeting held on 17.2.2014 vide item No.22 2) E) R-2 while considering the recommendations of Faculty of Science has approved the recommendation regarding award of M.Sc. (Computer Science) degree.

AND

Whereas, the matter is required to be regulated by framing the Ordinance and making of an Ordinance may likely to take some time.

AND

Whereas, the changes are to be made applicable from the Academic Session 2014-15.

Now, therefore, I, Dr.J.A.Tidke, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:

1) This Direction may be called, "Corrigendum to Direction No.25 of 2012, Direction, 2014"

2) This Direction shall come into force w.e.f. the date of its issuance.

3) In Direction No.25 of 2012, in Para 7., the lines "The average percentage of Marks of M.Sc. (Computer software) and percentage of marks of M.Sc. (Computer Science) shall be considered to award class / Grade for awarding the degree of M.Sc. (Computer Science)" be substituted by the lines "**The class / Grade for awarding the degree of M.Sc. (Computer Science) shall be awarded on the basis of performance at M.Sc. Part-II (Computer Science) only**".

Date : 3/5/2014

Sd/-
(Dr.J.A.Tidke)
Vice-Chancellor
Sant Gadge Baba Amravati University

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION

No. : 8 of 2014   Date : 07/05/2014

Subject :Corrigendum to Direction No. 14 of 2009 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course).

Whereas, Ordinance No.4/2008 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), Ordinance, 2008, in the Faculty of Science is in existence in the University.

AND

Whereas, Direction No. 14 of 2009 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course) in the Faculty of Science is in existence in the University.

AND

Whereas, the Academic Council in its meeting held on 17.2.2014 vide item No.22 2) E) R-1 while considering the recommendations of Faculty of Science has approved the B.C.A. degree holders of this University are eligible for admission to M.Sc. (Computer Software) course.

AND

Whereas, the matter is required to be regulated by framing the Ordinance and making of an Ordinance may likely to take some time.

AND

Whereas, the changes are to be made applicable from the Academic Session 2014-15.

Now, therefore, I, Dr.J.A.Tidke, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:

1) This Direction may be called, "Corrigendum to Direction No. 14 of 2009 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course) Direction 2014."

2) This Direction shall come into force w.e.f. the date of its issuance.

3) In Direction No. 14 of 2009 in respect of Examinations leading to the Degree of विज्ञान पारंगत (Master of Science) (Four Semester Degree Course), in para 3., after the lines " A person who has passed the Degree of Bachelor of Science with Post Graduate Diploma in Computer Science of this University OR " following lines be inserted

"The Candidates having B.C.A. degree of this University shall be eligible to take admission to M.Sc. Part-I (Computer Software) course OR "

Date : 3/5/2014

Sd/-
(Dr.J.A.Tidke)
Vice-Chancellor
Sant Gadge Baba Amravati University

Syllabus Prescribed for
M.Sc Part I Microbiology (Semester I)
THEORY

Paper I	Microbial Techniques	100 (80 + 20*) Marks
Paper II	Microbial Enzymology	100 (80 + 20*) Marks
Paper III	Microbial Physiology and Photosynthesis	100 (80 + 20*) Marks
Paper IV	Environmental Microbiology	100 (80 + 20*) Marks

PRACTICAL

Practical I	Soil Microbiology	100 Marks
Practical II	Analytical Biochemistry and Instrumentation	100 Marks

M. Sc Part I Microbiology (Semester II)
THEORY

Paper V	Biostatistics, Bioinformatics and Computer Applications	100 (80 + 20*) Marks
Paper VI	Enzyme Technology	100 (80 + 20*) Marks
Paper VII	Microbial Metabolism	100 (80 + 20*) Marks
Paper VIII	Environmental Microbiology and Extremophiles	100 (80 + 20*) Marks

PRACTICAL

Practical III	Environmental Microbiology and Biodiversity	100 Marks
Practical IV	Microbial Enzymology, Biostatistics and Computer Applications	100 Marks

M. Sc Part II Microbiology (Semester III)
THEORY

Paper IX	Molecular Biology	100 (80 + 20*) Marks
Paper X	Virology	100 (80 + 20*) Marks
Paper XI	Fermentation Technology	100 (80 + 20*) Marks
Paper XII	Immunology	100 (80 + 20*) Marks

PRACTICAL

Practical V	Fermentation Technology	100 Marks
Practical VI	Immunology and Medical Microbiology	100 Marks

M. Sc Part II Microbiology (Semester IV)
THEORY

Paper XIII	Biotechnology	100 (80 + 20*) Marks
Paper XIV	Clinical Virology	100 (80 + 20*) Marks

Paper XV	Microbial Technology	100 (80 + 20*) Marks
Paper XVI	Medical Microbiology	100 (80 + 20*) Marks

PRACTICAL

Practical VII	Applied Microbiology and Biotechnology	100 Marks
Project	Project Work	100 Marks

* **Internal assessment marks for theory Paper**

Notes:

The practical schedule of M.Sc. (Microbiology) should be as follows:

1. Each practical in M.Sc. Part I should be of 8 hours duration per week (4 hrs /day for two consecutive days).
2. Each practical in M.Sc. Part II (Practical II, project work & I) should be of 8 hours duration per week (8 hrs/days) for two days).
3. Atleast 70% practicals should be performing during each semester.
4. Examination of each practical should be at least for 10 Hr. (Split over two days)

M.Sc. Part I (Semester I) (MICROBIOLOGY) EXAMINATION
PAPER-I
MICROBIAL TECHNIQUES

Unit-I : **Biological Relevance of pH and Buffers:-** The pH dependents ionization of amino acids and proteins. Isoionic and isoelectric points. Effects of the pH change on non-protein protoplasmic components. The pH and metabolic reactions involving proton.

Unit-II : **Absorption and Emission of Radiation:** Principles laws of absorption of radiation, visible ultraviolet and infrared Spectrophotometry. Absorption spectra, fluorescence, fluorometry, flame photometry, NMR, ESR.

Unit III : **Isotopic Tracers techniques in Biology:-** Stable and radioactive isotopes, preparation, labeling, detection and measurement of isotopes. Dilution technique, Kinetics of radioactive disintegration.

Unit-IV : **Chromatography:** Paper, Column, thin layer, Gas, Ion exchange and affinity chromatography, Gel filtration.

Unit-V : **Electrophoresis:** Moving boundary, Zone (paper, gel etc.) electrophoresis. Immunoelectrophoresis, Isoelectric focussing.

PAPER-II
MICROBIAL ENZYMOLOGY

Unit-I : **GENERAL INTRODUCTION :**
  a) Introduction of Enzymology, Various terminologies, Properties of enzymes.
  b) Enzymes as catalyst.
  c) Enzyme activity units.

Unit II : a) Enzyme isolation and purification - Importance of purification, Methods of Purification and fractionation.
  b) Criteria of purity of enzymes - Tests of homogenecity.
  c) Classification, of enzymes - IUB nomenclature.
  d) Constitutive, Inducible and marker enzymes.

Unit-III: **ENZYME KINETICS:**
  a) Importance of Kinetic Study
  b) Effect of Enzyme concentration on progress curves.
  c) Effect of pH and Temperature.
  d) Effect of Substrate concentration - Concepts of ES complex, Steady state and Rapid state equilibrium kinetics, Derivation of Henry - Michaelis - Menten equation of rectangular hyperbola, Significance of Vmax and Km, Transformation of H.M.M. equation to a straight line equation, Construction of Lineweaver - Burk Plot, Single and Double reciprocal plots, Limitations of H.M.M. equation, Sigmoidal saturation kinetics, Co-operatively of an enzyme, Hill's equation, steady kinetics (Haldane and Brigg's equation).
  e) Bisubstrate enzyme kinetics.

Unit- IV a) Types of inhibitors (reversible and irreversible), Kinetics of enzyme inhibition (competitive, non-competitive, uncompetitive and mixed inhibitors), Graphical presentation of inhibition effects.
  b) Kinetics of reversible reactions (Haldane's relationship)
  c) Mechanism of action of lysozyme.
  d) Enzyme activators, Co-enzymes and Co-factors in enzymatic catalysis.

Unit-V: **MECHANISM OF ENZYME ACTION :**
  a) Concept of enzyme and substrate specificity.
  b) Chemistry of active Centre, chemical modification by active site directed reagents.
  c) Factors affecting catalytic efficiency of enzymes-covalent proximate, orientation, distortion or strain, acid-base and nucleophilic effects.

  d) Various theories of mechanism of enzyme action.
  e) Mechanism of action of lysozyme.

PAPER-III
MICROBIAL PHYSIOLOGY AND PHOTOSYNTHESIS

Unit-I : **Membrane Transport :** Structure and organization of biological membranes. Types of cellular transport, Passive, facilitated, Active, Group translocation, membrane bound and binding protein transport systems. Carrier models. Liposomes. Ion transduction NaK+, ATPase.

Unit II : **Energy metabolism:** ATP cycle, Free energy, standard free energy change, conventions in biochemical energetic, Calculation of DG. Standard free energy of hydrolysis of phosphate, compounds, Reservoirs of high-energy phosphate groups, Energy rich bonds, Biological energy transducer.

Unit-III : **Bacterial and Mitochondrial respiration:** Respiratory chain in mitochondria and bacteria, Oxidation-reduction enzymes. Respiration linked proton translocation.

Unit- IV : **Oxidative phosphorylation:** Coupling of oxidative phosphrylation to electron transport. Uncouplers, inhibitors, Reactions of oxidative phosphorylation, Mechanisms of oxidative phosphorylation. Chemical coupling, Conformational coupling and chemiosmotic coupling mechanism

Unit -V : **Microbial photosynthesis:** Structure of photosynthetic pigments, Primary photochemistry PS I & PS II and election transport. CO_2 fixation in bacterial photosynthesis, Anoxygenic and oxygenic photosynthesis, Halobacterial photosynthesis

PAPER-IV
ENVIRONMENTAL MICROBIOLOGY

Unit-I : **An Introduction :** Definition of environment, Interaction between environment and biota, Concept of the habitat in biosphere, Food Chain, Ecosystem, Community, homeostasis and ecosystem management.

Concept of sustainable development of ecosystem: Definition and Need of Sustainable developments. Role of bacterial technology in achieving sustainable development. Improvement and restoration of barren/degraded land. Pollution control, Renewable source of energy and fuel using microorganisms, biodiversity and its conservation

Unit-II : **Advancement in Biogeochemical cycles :**

Nitrogen cycle : Symbiotic and non-symbiotic 'N' fixation, Mechanism of nitrogenase, cross inoculation group and host specificity, energy input/output ratio of 'N' fixation process in crop production, Biochemistry of Nitrate reduction.

Unit -III : **Phosphours cycle :** Significance of 'P' element, Occurrence and solubilization in nature, role of phosphobacter and mycorrhizae in crop production.

Carbon cycle - General aspects, generation and decay of detritus 'C' compounds, features of plant cell wall polysa ccharides, cellulose & lignin degrading microorganisms, mechanism of enzymes and its products. Carbonic anhydrase and its role in carbon cycle.

Sulphur cycle - Significance of 'S' compound, microbial sulphur metabolism, sulphur oxidizing bacteria and mech an -ism, distribution of sulphur bacteria in nature, Biochemistry of sulphate reduction.

Selenium cycle - Significance and occurrence, metabolism, deficiency and toxicity.

UNIT-IV : **Biochemistry and Microbiology of acid mine drainage:** Process of biochemistry, Iron oxidizing bacteria, Microbiol ogy and Biochemistry of Metal and Metalloid transformation-ecological succession and control. Transformation of mercury, arsenic lead and tellarium. Biotransformation of pesticides.

Unit V **Biodeterioration :** Concept of biodeterioration. Biodeteri oration of Wood, Metal, pharmaceutical products and Stone Work.

Bioleaching: Introduction, application of bacterial leaching, leaching techniques, prospective of bioleaching.

PRACTICAL-I
Soil Microbiology

1. Study of antagonism in microorganism from soil.
2. Isolation of soil microorganisms.
3. Isolation, Identification, Enumeration of Nitrogen fixing microorganism from soil, rhizosphere, phylosphere and root nodule.
   a) Isolation of *Azotobacter* spp and *Azosprillum*
   b) Isolation and cultivation of *Rhizobium* from soil and roots nodules.
   c) Nodulation of legume roots - Leonard jar experiment.
   d) Isolation of cynobacteria
   e) Isolation of phosphobacteria from soil.

4. Estimation of nitrogen by kjeldhal method.
5. Preparation of biofertilizer/Biopesticides, enumeration of titer inoculum
6. Application of bioinoculant through seed, seedling and soil test under pot condition.
7. Isolation and microscopic examination of iron and sulphur bacteria.

PRACTICAL-II
ANALYTICAL BIOCHEMISTRY AND INSTRUMENTATION

1. Estimation of sucrose in presence of glucose.
2. Determination of pka of amino acids.
3. Estimation of proteins by biuret method.
4. Estimation of protein by Folin-Ciocalteau method.
5. Ultraviolet spectroscopy of proteins.
6. Absorption spectrum of p-nitro phenol
7. Paper chromatography of amino acids.
8. Paper chromatography of sugars.
9. Paper chromatography of purine and pyrimidine bases.
10. Separation of proteins by paper electrophoresis.
11. Separation of protein by gel electrophoresis.
12. Separation of pigments by adsorption chromatography.
13. Thin layer chromatography.
14. Estimation of DNA.
15. Estimation of RNA.

Distribution of marks in University Practical Examination:

1. Long Experiments	-	15 marks.
2. Short Experiment	-	10 marks
3. Viva-voce examination	-	05 marks
4. Spotting	-	05 marks
5. Practical record book	-	05 marks
6. Internal Assessment	-	10 marks
Total	**-**	**50 marks**

M.Sc PART I (MICROBIOLOGY) EXAMINATION
(Semester –II)
PAPER-V
BIOSTATISTICS, BIOINFORMATCS
AND COMPUTER APPLICATIONS.

UNIT-I : **Biostatistics :**

a) **Introduction:** Definition of Statistics, Statistical application in Biology, Types of statistics used in biology, sample statistics, test statistics, parametric Vs non -parametric

b) **Sample and Sampling:** Introduction, selection of sample or sampling, theory-qualitative sample, random sample, non-random sample.

c) **Graphical distribution of data**: Collection of data, classifi-cation of data, tabulation of data, graphic representation of data, diagrammatic representation of data

d) **Measures of Central tendency:** Measures of central tendency, Mathematical averages, - arithmetic mean, Geometric mean, Harmonic mean, Average mean- Median and Mode.

e) **Measures of Dispersion:** Definition, Range, Mean deviation, standard deviation, Standard error, Coefficients of variability, degree of freedom, confidence limit.

Unit II: a) **Test of Significance:** Standard error of mean, standard error of standard deviation, student's t-test, chi-square test.

b) **Probability:** Definitions, types of probabilities, Rule of probabilities, Random variable, probability distributions, theoretical probability distributions.

c) **Correlation:** Meaning of correlation, Definition, Kinds, properties of coefficient of correlation, method of studying.

d) **Regression**: Introduction. Difference between correlation and regression, objects of regression analysis, kinds of regression analysis, linear regression, regression equation, coefficient

e) **Vital statistics:** Introduction, definition, methods of obtaining vital statistics, principles, measurements of population, measures of vital statistics, measurements of Mortality, life table**.**

UNIT-III : **Computer Fundamentals:**

Basics of Computers, In-put and Out-put devices. Computer graphics. PC based software packages, Computer application in Microbiology / Biology. Computer's role, Modern computers, personnel computers, hardware, and software, Internet, Modem, freeware, Usenet, file transfer protocol, HTML, Browsers, Home page, URL, Search Engine, IP address.

UNIT IV: **Bioinformatics :**

a) Introduction, Definition, Importance, Analytical Approach, Application, Bioinformatics as tool, Role of bio and Chemo informatics in drug designs, Bioinformatics in life sciences, Studying bimolecular structures.

b) Biological Data base: Sequence database, Nucleic acid database, gene bank, proteins sequence data base, Swiss port, searching sequence data base, non reductant data base, Low annotation data base, specialized sequence data base, structure

data base, motif database, proteome data base, Other data base

c) Sequence analysis:

Unit V : **Bioinformatics Tools and Application**

a) Tools for Bioinformatics: Pair wise alignment, Dotpots, sco ring matrices, Blosum Matrices, PAM matrix, Gap penalty, Alignment Algorithms EMBOSS,

b) Proteins structure predictions: Secondary structure predictions, Tertiary structure Prediction, comparative modeling, folds recognition, Ab-initio prediction, Modeler, RASMOL.

c) Software in Bioinformatics: C/C, BioPerl, Biojava, BIoXML, BioCorba, BioPython, BioDas, BioML, Oracle.

d) Emerging areas in Bioinformatics: DNA microarrays, Functi -onal Genomics, Comparative Genomics, Pharmacogenomics, chemiinfrmatics, Medical informatics, Neural networks, phylogeny, whole cell stimulation, Human genome project.

PAPER-VI
ENZYME TECHNOLOGY

Unit-I : **MECHANISM OF ENZYME ACTION :**

a) Enzyme activators, Co-enzymes and Co-factors in enzymatic catalysis.

b) Concept of enzyme and substrate specificity.

c) Mechanism of action of lysozyme.

Unit-II : **CONTROL OF ENZYME ACTION :**

a) Regulation of enzyme activity-Feed-back control, enzyme introduction and repression, covalent modification.

b) Multienzyme complexes and their significance in metabolic control.

c) Membrane bound enzyme in metabolic regulation.

Unit III: d) Isoenzymes and their metabolic significance.

e) Allosterism - allosteric enzymes and Co-operativity.

f) Covalently modulated regulatory enzymes.

Unit IV: **COMPARTMENTATION AND IMMOBILIZATION OF ENZYMES:**

a) Compartmentation of enzyme and substrate and it's significance, Shuttle systems.

b) Naturally occurring Activators, Inhibitors and Co-enzymes.

c) Methods of enzyme immobilization, Industrial advantages. Immobilized multi-enzyme system.

d) Kinetics of immobilized enzymes.

e) Enzyme probes.

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Unit V: ENZYME TECHNOLOGY:
a) **Immobilization of Microbial enzymes:** Methods viz, adsorption, covalent bonding, entrapments and membrane confinement and their analytical , therapeutical and industrial application, Properties of immobilized enzymes.
b) **Enzyme engineering:** Chemical modification and site – directed mutagenesis to study the structure, function relationship of industrially important enzymes.
c) **Application of microbial enzymes:** Microbial enzymes in textile, leather, wood industries and detergents, enzyme in clinical diagnostics, Enzyme sensor for clinical processes and environmental analyses, Enzymes as therapeutic agents.

PAPER-VII
MICROBIAL METABOLISM
UNIT-I : **Carbohydrate metabolism :** EMP, ED, HMP, and phosphoketolase pathways in different microorganism. Fate of pyruvate. Gluconeogenesis.
Tricarboxylic acid cycle: Discovery, Intracellular location, Reactions of the cycle. Amphibolic nature. Anaplerotic reactions, Glyoxylate pathway.
UNIT II : **Aerobic metabolism of C1 Compounds:** Oxidation of methane, methanol, formaldehyde and formate. Ribulose pathways, Serine pathway, Xylulose monophosphate pathway.
UNTI-III : **Nucleotide metabolism:** Biosynthesis of purine and pyrimidine nucleotides, biosynthesis of deoxyribonucleotides, Regulation of nucleotide synthesis. Catabolism of nucleotides. Formation of coenzyme nucleotides. Inhibitors of nucleotide synthesis.
UNIT IV **Microbial metabolism of aromatic compounds:**
Ortho cleavage pathway, meta cleavage pathway, Gentisate pathway, reductive catabolism.
Catabolism of aromatic amino acids : Tyrosine, Tryptoph -an, phenylalanine
Lipid metabolism : Biosynthesis of fatty acids, triacylglyc -erol, phosphoglyceride, sphingomyeline and sphingolipids. Oxidation of saturated and unsaturated fatty acids.
UNIT-V : **Protein metabolism:** Assimilation of inorganic nitrogen,
Biosynthesis of amino acids: Branched chain amino acids, Aromatic amino acids, Sulphur containing amino acids, Basic amino acids.
Catabolism of amino acids: Glutamine, glutamate,

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Aspartate, Aspargine, L-alanine , D-alanine, proline, Serine, Glycine, Arginine, polyamines, Valine, Leucine and Isoleucine, Threonine, Lysine, Methionine, Cysteine.

PAPER-VIII
ENVIRONMENTAL MICROBIOLOGY AND EXTREMOPHILES
UNIT-I : **Recalcitrant organic compounds and concept of biomagnification:** Defination of recalcitrant organic compounds and their presence in natural ecosystem, concept and consequences of biomagnification, biomagnification of chlorinated hydrocarbons and pesticides. Biodegradation of recalcitrant and toxic chemicals.
UNIT II : **Eutrophication, and its management**: Eutrophication, Microbial changes induced by organic and inorganic pollutants, role of phosphorus and nitrogen in eutrophication, process and control of eutrophication.
UNIT III : **Extremophiles** - acidophilic, alkalophilic thermophilic, barophilic and osmophilic microbes - mechanisms and adoption. Halophiles - membrane variation - electron transport - application of thermophiles and extremophiles.
UNIT-IV : **Water Microbiology**
a) **Water treatment Process**, Disinfections, kinetics of disinfections, factors affection disinfecting drinking water, Halogens, (Chlorine, Chloramines, Chlorine di-oxide, Bromine and iodine) ozones, metal ions, Ultraviolet disinfections,
b) **Water distribution systems**,
c) **Concept of indicator organisms**, Total coliform, MTDT. MPN, MFT, P-A test, TTC, Fecal coliform, Fecal streptococci, Clostridium perfringens, Heterotrophic plate count, Bacteriophages, other indicator organisms, Standards and Criteria for indicators
UNIT V **Waste water Management:** Introduction to primary, secondary and tertiary treatment, activated sludge process, trickling filters, principles of anaerobic digestion, Methane formation with respect to waste treatment, Oxidation pond and stabilization pond, application of sewage, Aerated lagoons. Biochemistry of nitrate and sulphate reduction with a special reference to waste treatment.

PRACTICAL-III
ENVIRONMENTAL MICROBIOLOGY AND BIODIVERSITY
1 Isolation of *Salmonella* from polluted water.
2. Isolation of phage from sewage water.

3. Assay of bacteriophages.
4. Demonstration of human enteric viruses.
5. Enumeration of coliform and faecal *Streptococci* by MF/MPN technique.
6. Examination and estimation of water for:
   a) Ammonical nitrogen   b) nitrate
   c) nitrite   d) dissolved oxygen e)
   chlorides   f) sulphates
   g) Chemical oxygen demand   h) biochemical oxygen demand
   i) phosphates   j) calcium
   k) magnesium   l) hardness
   m) Alkalinity   n) solids-total dissolved & suspended
7. Enrichment of chemolithotrophs, methylotrophs, thermophiles, halophiles and acidophiles.
8. Enrichment and isolation of aliphatic hydrocarbon, phenol and parathion degraders
9. Study/Educational tour and submission of report.

PRACTICAL-IV
MICROBIAL ENZYMOLOGY, BIOSTATISTICS AND COMPUTER APPLICATION

1. Assay of following microbial enzymes.
   a) Amylase   b) Lipase   c) Protease   d) Invertase
2. Isolation and purification of certain microbial enzymes such as: protease, amylase, invertase by salt fractionation, dialysis, ion exchange.
3. Evaluation of kinetic constants of the purified enzymes.
4. Effect of different parameters on enzymes activity such as:
   a) pH   b) temperature   c) time   d) Enzyme concentration.
5. Effect of inhibitors on enzyme activity.
6. Fludized bed column reactor using immobilized whole cell to study catabolism.
7. Immobilization of enzymes.
8. Students seminar and submission of report.
b)   BIOSTATISTICS:
9. Organisation of data - frequency distribution.
10. Summarization of data -p describing a sample :
    Measures of central tendency - arithmetic mean, mode, median.(for grouped data)
    Measures of dispersion - variance and standard deviation.
11. Estimation of confidence interval for a normally distributed population.

12. Hypothesis testing - t-test, chi -square test, F-test.
13. Histograms.
D)   COMPUTER SCIENCE AND BIOINFORMATICS :
14) Computer operations getting acquainted with different parts of computers.
    Handling WINDOWS and Internet, E-mail and Internet. Use of CD ROM for literature search.
15) Accessign databases for nucleic acids and proteins.

Distribution of marks in University Practical Examination:

1.	Long Experiments	-	15 marks.
2.	Short Experiments	-	10 marks
3.	Viva-voce examination	-	05 marks
4.	Spotting	-	05 marks
5.	Practical record book	-	05 marks
6.	Internal Assessment	-	10 marks
	Total	**-**	**50 marks**

M.Sc PART II (MICROBIOLOGY) EXAMINATION
(Semester –III)
paper-IX
Molecular biology

Unit-I   :   Nucleic Acids : Importance of nucleic acid in living systems, general composition of nucleic acids, purine and pyrimidine bases, tautomeric forms of bases, reactions of purines and pyrimidines, structure of nucleosides and nucleotides, deoxynucleotides, cyclic nucleotides and polynucleotides. Watson and Crick model for DNA. Different types of DNA and RNA

Unit- II   DNA Replication:
   i) Enzymes of DNA replication in prokaryotes and eukaryotes, replication mechanisms in prokaryotes, eukaryotes, and phages.
   ii) DNA repair mechanism

Unit-III: a) Genetic recombination: Mechanism of genetic recombination, Transformation, Transudation, Conjugation and Transposable elements

   b)   Genetics and Molecular organization: Genes concept, genome, Multigene families, Pseudogenes, split genes, overlapping genes, genetic code

d) Gene mutation: Insertion deletion, frame shift and suppressor mutation, chemical and physical agents

Unit-IV: Protein Synthesis:

a) **Transcription:** RNA polymerases in prokaryotes and eukaryotes, process of transcription, concept of promoters and promoters types, enhancers and silencers and other regulatory elements, post transcriptional processing of tRNA, mRNA and tRNA, transcripts. Post transcriptional modification, spliceosome assisted and self-splicing of RNA transcripts. RNA dependent synthesis of RNA and DNA.

b) **Translation:** Protein synthesis, Translational process and control of translation, post-translational modification (covalent modification, phosphorylation, glycosylation, mythelation etc. protein targeting and degradation, non-ribosomal polypeptic synthesis Processing of RNA.

Unit-V : **Regulation of gene expression:** Gene regulation in prokaryotes - operon concepts (Lac operon and trp, arabinose operon), Negative & Positive Control, Sigma factor, Post translational regulation, etc.

Gene regulation in eukaryotes- Regulation at transcriptional and translational level, by gene rearrangement

PAPER-X
VIROLOGY

Unit-I : a) **Introduction to Virology:** Historical aspects: nature of viruses; origin and evolution of viruses, terminology, differentiation with other microorganisms.

b) **General properties of Viruses:** Morphology, size, host specificity, viral structure, shape, Chemical properties, Susceptibility to physical and chemical agents, Viral Haemagglunation,

c) **Replication:** Mechanism of virus adsorption and entry into host cell including genome replication, and m-RNA production by animal virus, mechanism of RNA synthesis, mechanism of DNA synthesis, transcription mechanism and post transcriptional processing, translation of virus, proteins, assembly, exit and maturation of progeny virions, multiplication of Bacteriphages.

d) Viral assay, viral genetics, Nomenclature of viruses.

Unit- II : **Virus-host Interaction:** Epidemiology, pathogenesis, Host response to virus Infections, Laboratory diagnosis of viral infection, Immunoprophylaxis, chemophylaxis and chemotherapy of viral diseases.

Interferons and Antiviral Agents: Definition, types of interferons; Nomenclature and classification of interferon. Types of inducer, induction of interferon. Antiviral effect of interferon; Molecular basis of antiviral state: Antiviral protein(s) (AVPS): ds RNA dependent pathways and ds RNA independent pathways. Interference not mediated by interferon (intrinsic factors).

UNIT III : **Laboratory Diagnosis of Viral Infections:** Microscopy, Cultivation of Viruses: Animal inoculation, chick embryo and tissue-cultures (MKC, Human Embrogenic Kidney cell culture, Human Amnion cell culture). Serology, detection of viral proteins and genetics material

UNIT IV : **Structure, Pathogenesis, Laboratory Diagnosis & immunology of viruses:** Pox virus, Herpes viruses, Adenoviruses Picorna viruses,

UNIT V : **Structure, Pathogenesis, Laboratory Diagnosis & immunology of viruses:** Orthomyxoviruse, Paramyxoviruses, Arboviruses, Rubella, Arenaviruses, Rabdoviruses, Hepatitis virus. Miscellaneous virus

PAPER-XI
FERMENTATION TECHNOLOGY

UNIT-I : **Bioreactors:** Design and type of fermentors, unit operation and techniques, batch and continuous fermentations, evolution of bio-kinetics constants. Significance of bio-kinetic constants, Computer control of fermentation process.

UNIT II : a) **Industrial production:** Penicillin, streptomycin, and tetracycline.

b) **Anticancer drug:** interferons, anthracycline, L-apsparginas es. Biotechnological application for the production of rare biological molecules, antibiotics, vaccines, steroids, hormones and diagnostic kits

Unit-III : Food and beverage production.

a) Cottage & cheddar cheese, Yoghurt and *Dahi*

b) Mycotoxin production

c) Oriental food fermentations: 1) Koji 2) Soya Sauce 3) Miso,

d) Single cell proteins, mycoproteins.

e) Types of different alcoholic beverages and production of whisky.

UNIT IV: **Food Technology:**

a) Starter culture for food industries,

b) Production and preservation of following fermented foods:
   i. Soya souse fermentation by moulds,
   ii. Fermented vegetables – Sauerkraut
   iii. Fermented Meat – Sausages
   iv. Production and application of Bakers Yeast
   v. Application of microbial enzymes in food industries.
c) Food borne infection and intoxications, bacterial with examples of infective and toxic types: *Clostridium, Salmonella, Shigella, Staphylococcus, Compylobacter, Listeria.*
d) **Quality assurance**: Microbiological quality of standard of food, Government regulatory practices and policies. FDA, EPA, HACCP, ISI.

Unit-IV: A) Biomass Production :

i) Bacterial biomass- production: a) Bacillus megatherium b) Acinebacter cerificans.

ii) Fungal biomass production: Paecilomyces varioti by Pekilo process &Candida utilis from hydrocarbon.

B) Prebiotics and probiotics
   a) Importance of probiotics
   b) Sources of Prebiotics
   c) Probiotics organisms
   d) Desirable characteristics
   e) Benefits of probiotics consumption

PAPER-XII
IMMUNOLOGY

Unit-I : **Basic Immunology**- Anatomic organization of the immune system cell types and organs. Effect of mechanisms involved in specific and nonspecific immune mechanisms. characters. Immune Response- primary, Secondary, Immunological memory.

Unit- II **Antigens, and Immunogenicity**, variation in antigenic Antibody and Immunoglobulins- Structure and functions of IgG, IgA, IgM, IgD, & Ig E., Antigen-Antibody reactions.

Unit-III : **Clinical Immunology -** Complement system; classic and alternate pathways and functions,. Cell medicated immuncity. Immunological tolerance and Immunosuppression. Tumors Immunological. Autoimmunity and Autoimmune diseases,

Unit- IV : A) Hypersensitivity, Immune deficiency diseases, MHC class Molecules.

B) Conventional vaccines, peptide vaccine, subunit vaccine, genetically engineered vaccines, production and application of lymphokines. Antibody diversity, Immunogenetics.

Unit-V : **Immunobiotechnology & Hybridoma Technology:**
Immuni zation of animals, isolation of stimulated spleen cells, myeoloma cell lines used as fusion partners, fusion method, detection and application of monoclonal antibodies,

PRACTICAL-V
APPLIED MICROBIOLOGY

a) Applied microbiology
   1) Isolation of antibiotic producing organism from soil.
   2) Microbiological assay of antibiotics and purification by ion-exchange resin.
   3) Determination of kla for fermenter.
   4) Preparation of yoghurt, koji, cheese. Idli
   5) Preparation of Flavor and aroma.
   6) Solid state fermentation of some product.
   7) Microbiological assay of amino acids .
   8) Microbiological assay of vitamins.

b) Plant tissue culture:
   9) Preparation of media for plant cell culture.
   10) Callus from explants.
   11) Haploid cell culture.
   12) Proto-plast culture.
   13) Educational tour and submission of report.

PRACTICAL-II
IMMUNOLOGY AND CLINICAL MICROBIOLOGY

1. Diagnostic methods for isolation and Identification of pathogenic microorganisms from the following specimens:
   (a) Blood (b) Urine (c) Cerebrospinal fluid (d) Throat (Swabs)
   (e) Sputum (f) faeces (g) Pus and wound (infection) fluid.

2. **Isolation and identification of following pathogenic bacteria:**
   (a) Staphylococcus aureus (b) Streptococcus pyogenic
   (c) Streptococcus pneumonia (d) Salmonella typhi and paratyphi A.B.C. (e) Shigella Species (f) Escherichia coli (g) Proteus vulgaris (h) Pseudomonas aeruginosa (i) Vibrio cholera (j) Mycobacterium tuberculosis (k) Clostridium titanic

3. **Serology:**
   a) VDRL Test b) RPR test c) Kahn test d) Widal test
   e) C-Reactive protein f) Anti streptomycin-o g) R.A. Factor

h) ELISA test i) Surface visual B-96 test (ELISA)

j) Latex agglutination test (pregnancy test)

4. **Diagnostic Immunology:**
   a) Double diffusion methods of ouchterolony
   b) immunoelectrophoresis
   c) Quantitative determination of plasma protein by immunoeletrophoresis.
   d) Single radial immunodiffusion.
   e) Estimation of antigen-antibody response by immunodiffusion technique.
   f) Estimation of antigen-antibody response by immunoelectrophoresis.

5. **Preparation of monoclonal antibodies.**

6. **Hematology:**
   a) Estimation of HB, b) PCV c) Blood cell counts W.B.C. & R.B.C.
   d) ESR e) blood smear examination f) bleeding time g) clotting time
   h) prothrombin time i) prothrombine determination j) Lab. diagnosis
   of leukaeminias.

7. **Study of medical Parasitology:**
   a) E. histolytica b) Trypanosomes
   c) Leishmania and d) Plasmodium

8. **Stool Examination for:**
   a) Ova, cysts of intestinal parasite blood cell and pus cells b) Occult
   blood, c) Characteristics of the stool in amoebic and bacillary
   dysentery.

9. **Antibiotic and chemotherapeutic agents:**
   a) Antibiotic sensitivity test.
   b) Assay of antibiotic level in the body fluids.

11. **Routine examination of urine.**

12. **Student seminar and submission of report.**

Distribution of marks in University Practical Examination:

1. Long Experiments (At least two)	-	15 marks.
2. Short Experiments	-	10 marks
3. Viva-voce examination	-	05 marks
4. Spotting	-	05 marks
5. Practical record book	-	05 marks
6. Internal Assessment	-	10 marks
Total	**-**	**50 marks**

M.Sc Part II (Semester IV)
Paper XIII
BIOTECHNOLOGY

Unit-I : **Genetic Engineering**
   a) **Enzymes used in recombinant DNA technology:**
   Endonucleases, ligases, Enzymes to modify DNA molecules.
   b) **Vectors:** Plasmids, plant vector, bacteriophages, cosmids,
   phagmides, animal viruses, plants viruses, special vectors.

UNIT II : **Genes cloning in prokaryotes & Eukaryotes:** Isolation of
   gene, Methods of gene transfer, Selection and screening of
   recombinant DNA, nucleic acid hybridization and clot curves,
   southern, northern and western blotting techniques, dot and
   slot blots, colony hybridization.

UNI III : **Cloning strategies:**
   a) Cloning from m-RNA and genomic DNA, synthesis of gene,
   gene probes, gene banks, gene libraries, mapping of gene,
   DNA sequencing, RFLP, DNA finger printing, site direct
   mutagenesis.
   b) Polymerase chain reaction & gene amplification.

Unit-IV : **Plant Biotechnology:**
   a) Culture media and plant cell culture
   b) Tissue culture, micropropogation and somaclonal variation
   c) Production and use of haploid cell culture
   d) Protoplast culture, regeneration and somatic hybridization
   e) Gene transfer method in plants, transgenic plants and animals.

Unit-V : **Application of Biotechnology:**
   a) Application in agriculture, plants and animal improvement.
   b) Enzyme biotechnology
   c) Protein engineering, immunotoxins and drug designing
   d) Metabolic engineering for over production of metabolites.
   e) Use of microbes in industry and agriculture
   f) Application to medical sciences, gene therapy, genetic
   counseling, diagnosis of diseases and phenomenon of ageing.
   g) Control of environmental pollution, recovery of minerals and
   restoration of degraded lands

PAPER-XIV
CLINICAL VIROLOGY

Unit-I : **Plant Viruses:** Classification, life cycle and replication of tobacco mosaic virus (TMV), PVX, PVY, CMV, TSWV, CaMV, Cynophages, Mycoviruses

Unit-II : **Bacterial Viruses:** Life cycle, Structure and replication of following RNA and DNA phages: Ox 174 phage, T4 phage; Lambda phage. (Lyric and glycogenic Cycle); Ft phage; MS2, f2, QB phages and Mud phage and O6 phage.

Unit- III : a) **Oncogenic Viruses (Tumor Viruses) :** Classification of viruses characteristics of virus transformed cell or tumor cell.

    i) DNA - Containing Tumor Viruses :

    ii) RNA - Containing Tumor Viruses : Retroviruses (oncornaviruses) .

Unit- IV : a) **AIDS viruses: Retro viruses, HIV**

Unit- V : **Viroids and Prions.**

PAPER-XV
MICROBIAL TECHNOLOGY

Unit - I : Isolation and screening of microorganisms, maintains of isolates/ strains, Inoculum developments, sterilization, strain improvement, process development, Downstream processing, In situ recovery of products. General scale up procedure

Solid-state fermentations

Manufacturing cost estimation

Principal and general consideration in down stream processing.

Unit-II: a) **Fermentation of acids:** Aspartic acid, L glutamic acid and Gluconic acid.

    b) **Modern trends in Microbial Productions:** Bioplastic (PHB, PHA) Biopolymer (Dextran, alginates, xanthan, Pullulan)

Unit- II **Fermentation Of enzymes and Amino acids:** Amylase, Protease. Riboflavin, cyanocobalamine,

Unit- III : **Enzyme biotechnology:** Immobilization of enzymes - (glucose -isomerase) Methods, bioreactors and application in industry. Enzyme electro catalysis. Biosensors- Bioelectodes, Optrons, Immunological biosensors.

Unit-IV : **Fuel Biotechnology**: Biofuels, Energy crops, Biogas, Bioethanol, Biobutanol, Biodiesel, Biohygrogen.

Unit- V : **Biofertilizers and Biopesticides.**

    a) Basic concept: PSM, N2 Fixer, S-solubilizers etc, K-solubilizers

    b) Biomass production

    c) Formulation (Carrier based, dried, liquid, and mixed inoculum)

    d) Application methods

    e) Inoculation quantity concept.

    f) Biopesticides: Bacterial, fungal, viral etc.

    g) Biocontrol mechanism,

    h) Preparation and application of Biopesticides

PAPER-XVI
MEDICAL MICROBIOLOGY

Unit-I : **Pathogenic bacteria and laboratory diagnosis:** *Staphylococci, Streptococci including pneumococci, Mycobacterium tuberculosis* and *M. leprea*

Unit-II **Pathogenic bacteria and laboratory diagnosis:** *Escherichia, Klebsiella, Proteus, Salmonella, Shigella, Pseudomonas, Bordetella, Heamophilus, Vibrio, Camphylobacter, Treponema, Borrelia, Leptospira, Corynebacteria, Mycoplasma* and *Rickettsia.*

Unit-III **Pathogenic fungi and their laboratory diagnosis:** *Microsporum, Trichophyton, Epidermophyton, Candida albican, Cryptococcus neoformans, Blastomyces dermatitidis* and *Histoplasma capsulatum.*

Unit- IV **Parasites and their laboratory diagnosis:** *Entamoeba histolytica, Leishmania donovani, Trypanosoma spp., Plasmodia species, Taenia saginata, Taenia solium Echinococcus granulosus, Hymenolepsis nana, Ascaris lumbricoides, Enterobius verrmicular* and *Wuchereria bancrofti.*

Unit V : **Clinical Microbiology:** Normal microbial flora of human body, sore throat and pneumonia, UTI, Diarrahaial diseases, Meningitis, Bacterimia, septicimia, Infective Endocarditis, PUO, STD, Hospital acquired infections, , Prophalaytic imuunization, antimicrobial therapy, Antimicrobial sensitivity testuing, Hospital waste management, Vechicals and vectors.

PRACTICAL-VII
APPLIED MICROBIOLOGY AND BIOTECHNOLOGY
RECOMBINANT DNA TECHNOLOGY

1) Agarose gel Electrophoresis
2) Restriction Digestion of DNA
3) DNA Ligation
4) DNA Molecular size Determination
5) DNA Fingerprinting
6) Southern hybridization
7) Restriction Mapping
8) In vitro Transcription
9) Southern Blotting
10) Northern Blotting
11) Plasmid preparation
12) Genomic DNA isolation.
13) Gene Cloning
14) Bacterial Gene expression.
15) Bacterial Transformation
16) Bacterial Conjugation
17) Bacterial Transduction
18) Whole Blood DNA extraction.
19) Educational tour and submission of report.

Project work (Marks 50)

Distribution of marks in University Practical Examination:

1. Long Experiments (At least two)	-	15 marks.
2. Short Experiments	-	10 marks.
3. Viva-voce examination	-	05 marks
4. Spotting	-	05 marks
5. Practical record book	-	05 marks
6. Internal Assessment	-	10 marks
Total	**-**	**50 marks**

Distribution of marks in Project work Examination:

1. Valuation project	-	40 marks
1. Internal Assessment	-	10 marks
Total	**-**	**50 marks**

Project Work -
Examination of Project Work :

1. The examination should be held at the centres of practical examination.
2. There shall be panel of examiners including Head of the department and the Supervisor of the Student.
3. There should be at least 2 to 3 external examiners for a batch of up to 10 Students or 3 to 5 external examiners for a bach of more than 10 Students.
4. The Students should submit the project reporty within 20 days after the last/final theory paper in University examination.
5. The date of Viva-voce examination on project work should be within the 30 days after the completion of theory examination

Distribution of marks in Project work examination:

1. Evaluation of Project		20 marks
2. Viva--voce (Jointely by internal and external examiners)		20 martks
3. Internal Assessment		10 marks
	Total :	50 marks

Books recommended for M.Sc. Part-I & Part-II (Microbiology)

1. Biophysical Chemistry - Upadhyay & Nath (Himalaya Pub.)
2. Practical Biochemistry - Plummer (TMH Pub.)
3. Principal of Biochemistry - Lehninger (CBS Pub.)
4. Practical Biochemistry - Jayraman (Wiley Estern Pub.)
5. Physical Biochemistry - Morrison (Oxford)
6. Enzyme - Dixon &. Webb
7. Fundamentals of Enzymology - Lewis (Oxford)
8. Bacterial metabolism - A.H. Rose
9. Biochemistry - West & Toad
10. Out line of Biochemistry - Corn & Stump. (Wiley Eastern Pub.)
11. Soil Microbiology - Alexander (Wiley Eastern Pub.)
12. Genes VIII - Lewin (Oxford)
13. Element of Biotechnology - P.K. Gupta. (Rastogi Pub.)
14. Fundamentals of Biotechnology - Purohit & Mathur (Agro Bot. Pub.)
15. Essentials of molecular biology - Freifelder D. (Narosa Pub.)
16. A textbook of biotechnology - Duby (S. Chand Pub.)
17. Molecular Biology - Freifelder D. (Narosa Pub.)
18. Microbial Genetics - Freifelder D. (Narosa Pub.)

19. Text Book of Molecular Biology - Shastry & Other (Macmillan)
20. Hand Book of Tissue Culture (ICAR Pub.)
21. A textbook of Biotechnology - H.D. Kumar (E.W. pub.)
22. Basic Biotechnology Rev. Iganacimuthu (TMH Pub.)
23. Plant viruses - Mandahar (S. Chand & Co.)
24. Microbiology Lewis. (Harper)
25. Microbiology - Fundamentals & Application - Purohit. (Agro Botanical Pub.)
26. Industrial Microbiology - Casida (Wiley Eastern pub.)
27. Press Scott and Dunn's Industrial Microbiology.
28. Microbiology - Anantnarayan & Panikar (Orient Longman)
29. A text book of Microbiology, — P. Chakraborty (Central Pub.)
30. Medical Microbiology - Ichhapunani & Bhatia (J.P. Brothers)
31. Essential of Medical Mycology - Evans & Genitals (Churchill and Livingston)
32. Genetics by Strickbeger (Prentice Hall)
33. A short textbook of recombinant DNA technology Watson. (Black Well)
34. Molecular Biotechnology - Prime Rose - (Black Well.)
35. Immunology by Shetty - (Wiley Eastern Pub.)
36. Molecular biology of genes. Watson - (Begamin Cumming))
37. Recombinant DNA technology - Rodriguez (Begamin Cumming)
38. Advances in molecular genetics. Puhlar. (Begamin Cumming)
39. Molecular cloning - A lab manual. (Cold spring harbor lab pub.)
40. Concept of molecular biology - Rastogi (Wiley Eastern Pub.)
41. Genetic Engineering - Sandhy Mitra (Macmillan)
42. Elementary Microbiology Vol. I Vol. II (Fundamental of microbiology and microbial world) Ed. by. H.A. Modi. (Akta Prakashan)
43. Applied microbiology. Ed. by H.A. Modi. (Akta Prakashan)
44. Environmental Microbiology. Ed. by H.A. Modi (Akta Prakashan)
45. Fundamentals of Dairy Microbiology by J.B. Prajapati (Akta Prakashan)
46. Bio-Fertilizer. By Vyas & Modi (Akta Prakashan)
47. Biochemistry. By D. Das (Academic Pub.)
48. Biophysics & Biophysical Chemistry. By D. Das. (Academic Pub.)
49. Modern Immunology. By A. Das Gupta (Jaypee Pub.)
50. A textbook of microbiology by P. Chakraborty (New Central Book Agency)
51. Principal of gene manipulation by Old & Prim Rose (black well pub.)
52. Agricultural microbiology by Rangaswami & Bagyaraj (PHI)

53. An introduction to recombinant DNA by A.E.H. Emery (ELBS)
54. Concepts in Biotechnology by D. Bakasubramuniam and other (University Press.)
55. Introduction to genetics Engineering by D.S.T Nicholl (Cambridge)
56. Genetics by P.K. Gupta (Rastogi Pub.)
57. Genetics by Sandhya Mitra (TMH)
58. Applied plant biotechnology by Iganacimuthu (TMH)
59. Immunodiagonostics S.C. Rastogi (Wiley Eastern Pub.)
60. Immunology by Roitt. (Black well)
61. A textbook of Microbiology. R.C.Dubey and D.K.Maheshewari. (S.Chand & Company)
62. Genetics - A.V.S.S. Sambamurty (Narosa Pub.)
63. Concept of Molecular Biology. P.S.Varma & V.K. Agrawal. (S.Chand & Company)
64. General Microbiology S.B. Sullia and S. Shantharam. (Oxford & IBH)
65. Modern Concept of Biotechnology. H.D.Kumar (Vikas Pub.)
66. Fundamentals of Enzymology - Price and Steven (Oxford Sci.Pub.)
67. Gene VII - Lewis (Oxford Science Publication)
68. Molecular Cell Biology, Berk, Lipursky, Baltimore, Darnell and Matsuduira (W.H. Freeman and Company)
69. Biotechnology - Rhem and Reead
70. Standard method s of Biochemical analysis - S.R. Thimmaiah (Kalyani Publisher).
71. Laboratory Manual of Bacterial Genetics - Institute of Microbial Technology - Chandigarh.
72. A textbook of Industrial Microbiology - Wulf Crueger and Annekiese Cruger (Panima Publishing Corporation)
73. An Introduction to electrophoresis - K. Anbalgan (The Electrophoresis Institute, Salem Dist.S. India.)
74. Waste water microbiology - Gabrian Bitton (John Wiley & Sons)
75. Environmental Microbiology - Ralph Mitchell (John Wiley and Sons).
76. Microbial Biotechnology - Fundamentals of applied Microbiology - Alexander N. Glazer, and Hiroshi Nikoidu (W.H. Freeman and Company)
77. Gene structure and expression - John D. Hawkins (Cambridge University Press)
78. Biotechnology - John G. Smith, (Cambridge University Press)
79. Plant Biotechnology - S. Ignacimuthu S.J. (Oxford and IBH, New Delhi)
80. Advanced molecular biology - R.M.Twyman (Viva book Pvt.Ltd.)

81.   Introductiory Microbiology - J.Heritage, E.G.V. Evans and R.A.Killington (Cambridge University Press)

82.   General Microbiology - Schiegel (Cambridge University Press)

83.   Gene Structure - Hawkins (Cambridge University Press)

84.   Modern Concepts of Biotechnology - H.D.Kumar, (Vikas Publishing Pvt.Ltd.)

85.   A textbook of Microbiology - R.C.Dubey and D.K.Maheshewari (S.Chand & Company)

86.   Biotechnology - Applications and Research - Edited by Paul Cheremisinoff and Robert Ouellete (Technomic Pub.Co.Inc.)

87.   Basic and Clinical Immunology - Daniel Stites, Abba Terr & Tristram Parslow (Prentice Hall International INC)

88.   A Text Book of Biochemistry with Clinical correlation - Edited by Thomas Devlin (John Wiley and Sons, INC).

89.   Microbiology Laboratory - Fundamentals and Application, George Wistreich (Prentice Hall)

90.   Microbiology - A Laboratory Manual - James Cappucino and Natalic Sherman (The Benjamin / Cummings Pub.Co.Inc.)

91.   Foundations in Microbiology - Kathleen Talaro & Arthur Talaro (Wm.C. Brown Publishers)

92.   Principles of Microbiology - Ronald Atlus Mosby.

93.   Fundamentals of Microbiology - Alcamo (Benjamin / Cummings Pub.Co.Inc.)

94.   Sale and Molecular Biology - Concepts and experiments - Gerald Karp (John Wiley and Sons, INC).

95.   Cellular and Molecular Immunology - Abul Abbas, Andrew Lichman & Jordan Pober (W.B.Saunders Co.)

96.   Biochemistry-Zubay (Wm C.Brown Publishers)

97.   Life-An Introduction to Biology - Beck, Liem & Simpson (Harper Collins Publishers)

98.   Genetics - A.V.S.S. Sambamurthy (Narosa Publication)

99.   Water Pollution - V.P.Kudesia, (Pragati Prakashan Meerut)

100.   Physicochemical Examination of Water, Sewage and Industrial waste - N. Maniwasakam (Pragati Prakashan, Meerut)

101.   Textbook of Biochemistry - O.P.Agrawal, G.R.Agrawal (Goel Publishing House, Meerut)

102.   Textbook of Medical Mycology - Jagdish Chander (Interprint, New Delhi)

103.   An introduction to Plant tissue and Cell culture - N.C.Kumar (Emkay Publication Delhi)

104.   Short Protocols in Molecular Biology - Edited by Ausubel, Brent, Kingston, Moore, Seidman, Smith and Struhl (John Wiley and Sons)

105.   Molecular Cell Biology - Dernell, Lodish and Baltimore, (Scientific American Books)

106.   Technological Applications of Biocatalysts - Published on behalf of Open University and University of Greenwich (Butterworth-Heinemann).

107.   Microbiology-Principle and Explorations - J.G.Black (John Wiley and Sons)

108.   Techniques for engineering Genes - Published on behalf of Open University and University of Greenwich (Butterworth-Heinemann).

109.   Biotechnological Innovations in Energy and Environmental management - Published on behalf of Open University and University of Greenwich (Butterworth-Heinemann).

110.   Medical Microbiology - Mims, Playfair, Roitt, Wakelin and Williams (Mosby)

111.   Principles of Enzymology for the Food Sciences (John Whitaker, Marcel Dekker, Inc.)

112.   Biostatistics - A Foundation for analysis in Health Sciences - W.D.Daniels, John wiley and Sons.

113.   Basic Statistics - C, Dunn

114.   How Computers Works - Ron White, Techmedia.

115.   How the Internet works - Preston Gralla, Techmedia.

116.   Bioinformatics - 1998 - Baxevanis

117.   Bioinformatics - 2000 - Haggins & Taylor OUP.

118.   Fundamentals Biostatistics- Sadguru Prakash, Emkay Publication, New Delhi.

119.   Bioinformatics for Beginners - Dr.K.Mani & N.Vijayraj (Kalai Kathir Achchagani Pub. Coimbatore)

120.   Instant Notes - Bioinformatics - West head, Parish and Twyman (Viva Publication) New Delhi.

121.   Schaum's Outlines - Biochemistry, Kuchel & Ralston (TMH Edition)

122.   Schaum's outlines - Microbiology (TMH Edition)

123.   Schaum's outlines - Molecular and cell Biology (TMH Edition)

124.   Principles of Genetics - R.H.Tamarin (TMH Edition)

125.   Biotechnology DNA - Protein A Laboratory project in molecular Biology. Thiel, Bissen & Lyons (TMH Edition)

126.   General Enzymology, Kulkarni and Deshpande, Himalaya Publishing House.

127.   Modern Approaches to Soil and Agriculture and Environmental Microbiology, Shiva Aithal and Nikhilesh Kulkarni, Himalaya Publishing House.

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