BANGALORE UNIVERSITY

Jnana Bharathi, Bangalore-560 0 56

No. Aca.II/CBCS/2014

Date: 29/11/2014

To

1. The Deans of Faculties, Bangalore University
2. The Chairpersons/Directors/Coordinators of Departments of Studies/Boards of Studies,Bangalore University,
3. The Principals of Colleges affiliated to Bangalore University.

Madam/Sir,

Sub: UGC Guidelines on adoption of Choice Based Credit System.
Ref: Letter D.O. No. F.1-1/2014 (Secy), dated 12th November, 2014 from the Secretary, UGC, New Delhi.

This is to inform that the UGC has embarked on numerous measures to enhance efficiency and excellence in the higher education system in the country. The reforms undertaken in this regard have led to noticeable improvement in the standards of education. However, because of the diversity in the evaluation system followed by different Universities in India, students have suffered acceptance of their credentials, at times, across the University system, as well as the employment agencies.

In order to mitigate this procedure, the UGC has formulated Guidelines on adoption of Choice-Based Credit System (CBCS) by all the Universities. This would ensure seamless mobility of students across the higher education institutions in the country as well as abroad. The credits earned by the student may be transferred and would be of great value to the students in the event of their seeking migration from one institution to the other. You are requested to access the Guidelines from the UGC website www.ugc.ac.in.

It may be kindly be noted that Bangalore University has already introduced Choice Based Credit System in the Undergraduate and Postgraduate Courses from the academic year 2014-15 and the draft Regulations in this regard have already been circulated to all the Principals. Necessary modifications to the draft Regulations will be made as per the present UGC Guidelines and will be sent to the State Government for approval and the same will be circulated to all the concerned.

Yours faithfully,

REGISTRAR 29/11/14

ST FRANCIS DE SALES COLLEGE BANGALORE

PRINCIPAL
St. Francis de Sales College
Electronics City Post, Bangalore - 560 100

IQAC

BANGALORE UNIVERSITY

PROCEEDINGS OF THE EXTRA-ORDINARY MEETING OF THE ACADEMIC COUNCIL HELD ON 13-08-2014 AT 2.30 P.M. IN THE SENATE HALL, BUB.

Members Present:

1.	Prof. B. Thimmegowda, Vice-Chancellor	Ex-Officio- Chairman
2.	Mr. Ramachandra Gowda, MLC	Member
3.	Dr. Rajesh. E.B.	Member
4.	Dr. N. Ramachandraswamy	Member
5.	Mrs. Prabhavathi Bai	Member
6.	Prof. K. Ramesh	Member
7.	Mr. K.B. Vishwanatha Reddy	Member
8.	Dr. Rajashekar. N.	Member
9.	Prof. Govindaiah	Member
10.	Prof. M.S. Talwar	Member
11.	Prof. D. Jeevan Kumar	Member
12.	Dr. Suresh V Nadagoudar	Member
13.	Prof. M.K. Sridhar	Member
14.	Prof. B.K. Muralidhara	Member
15.	Mrs. Lydia Samuel	Member
16.	Prof. Nathalia D' Souza	Member
17.	Mrs. Aruna Kumar. N.	Member
18.	Prof. M. Ramachandra Mohan	Member
19.	Prof. B.C. Prabhakar	Member
20.	Prof. D. Anusuya	Member
21.	Prof. A.S. Rayamane	Member
22.	Dr. Anjanappa. M.	Member
23.	Dr. Ramakrishnaiah	Member
24.	Prof. H.N. Ramesh	Member
25.	Prof. S.R. Ananthanarayana	Member
26.	Dr. K. Muni Reddy	Member
27.	Mr. Nagaraj Sherigar, Finance Officer	Member
28.	Prof. K.N. Ninge Gowda, Registrar (Eval.)	Member
29.	Prof. K.K. Seethamma, Registrar	Member - Secretary

At the outset, the Chairman welcomed all the members for the meeting and informed the members about the sad demise of Dr. N.H. Manjunath, Dean, Faculty of Science, BUB. The House observed two minutes silence as a mark of respect to the departed member. Then, the Chairman requested to take up the Agenda.

Item No.1: To consider the report submitted by the Local Inquiry Committee under the Chairpersonship of Prof. L. Gomathi Devi, Dept. of Chemistry, BUB.

Prof. L. Gomathi Devi, Chairperson of the LIC presented the report of the Local Inquiry Committee in respect of Bangalore City College of Education, Bangalore and Sri Venkateshwara College of Education, Bangalore. She informed the House that the Local Inquiry Committee visited the above two colleges on 02-08-2014 and checked all the infrastructure and requirements necessary as per NCTE norms. The Principal of Bangalore City College of Education, Bangalore produced all the records and list of staff approved by the University and registers viz., admission, attendance, aquittance, stock, scholarship disbursement registers before the Committee. She informed that the staff are not qualified with NET/SLET and the staff quarters have not been provided by the college. Further, the college has made 28 admissions during the year 2013-14 and 15 during 2012-13. The college has to equip the Library with required nos. of books as per NCTE norms. The College has got 49.2% weightage as per new tool.

In respect of Sri Venkateshwara College of Education, Bangalore the Principal had shown the 3rd floor of the building meant for B.Ed. course which is of 11,644 sq.ft. floor area. The college has appointed a Librarian. 100 students were admitted for 2013-14. However, none of the students were present during the visit of the Committee. We were told that students had gone for teaching practice classes. The Library needs to be upgraded with adequate no. of books as per NCTE norms.

The Committee has recommended for renewal of affiliation to the above two colleges and she requested the House to consider the report.

Dr. Rajesh E.B., informed the House that, his college (Cauvery College of Education) was made as centre for examination for the year 2012-13 for the students of Bangalore City College and the admission register of the said college which was produced at the time of examination is still in their custody and the college has not taken back the register. The Chairperson of the Local Inquiry Committee opined that admission register of 2012-13 shown to the Committee might be the other one. Dr. Ramesh. K, said that the floor area of Bangalore City College of Education is 4,868 sq.ft. x 3 floors and it is short of NCTE requirements. Hence, the affiliation cannot be given to Bangalore City College of Education. Prof. Jeevan Kumar and Prof. B.C. Prabhakar felt that the affiliation can be given as the College has secured 49.2%

weightage. However, the observations recorded by the Local Inquiry Committee and comments made in the Academic Council meeting may be communicated to the colleges.

Prof. M.K. Sridhar expressed that the Local Inquiry Committee tool was prepared after discussion in the Academic Council as well as Syndicate. Hence, we should respect the new tool and the recommendation of the Local Inquiry Committee may be accepted.

Resolution: After detailed discussion the House resolved to accept the recommendations of the Local Inquiry Committee.

Item No.2: To consider the re-inspection reports submitted by the Local Inquiry Committee under the Chairmanship of Prof. Govindaiah, Professor, Department of Sericulture, Bangalore University, Bangalore.

Prof. Govindaiah, Chairperson of the Local Inquiry Committee informed the House that the Committee under his Chairmanship re-inspected four colleges for enhancement of intake and renewal of affiliation. The Committee has recommended for enhancement of intake from 30 to 40 for BCA course at Global Institute of Management Science, Bangalore and for enhancement of intake to B.A.S.L.P. course from 20 to 30 at Samvaad College of Speech and Hearing, Bangalore. Further, the Commitee has recommended for renewal of affiliation to Mother Theresa College of Management and Science, Nelamangala as the college has good infrastructure and the college is situated in rural area. However, in respect of DBA Degree College, Bangalore the Committee visited the address given and there was a name board of the college but nobody was present there and it was told that the college does not exist in the said address. He further informed that, the Committee had made repeated efforts to call the college office land line numbers and Cell Phone numbers but invain. The Committee had to return without visiting the Institution.

Resolution: After detailed discussion, the House resolved to approve the recommendations of the Committee in respect of the following Colleges.

Sl. No.	Name of the College	Recommendations of the Committee
1.	Global Institute of Management Science, Rajarajeshwari Nagar, Bangalore-560 098	Recommended for enhancement of intake for B.C.A. course from 30 to 40 for the year 2014-15.
2.	Mother Theresa College of Management and Science, 94/1, Arasanakunte Danojipalya, Nelamangala, Bangalore-24	Recommended for renewal of affiliation for the year 2014-15 to B.B.M. and B.Com courses with existing sanctioned intake.

3.	Samvaad College of Speech and Hearing, # 18, 1st cross, 5th Main, Anandagiri Extension, Hebbal, Bangalore-24.	Recommended for enhancement of intake to B.A.S.L.P. course from 20 to 30 for the year 2014-15.

Further, the House resolved to recommend for disaffiliation of DBA Degree College, Rupena Agrahara Village, Begur Hobli, Hosur Road, Madiwala, Bangalore-68 as the same findings were made by the earlier Committee.

Item No.3: To consider the recommendations of the Faculty of Commerce Meeting held on 7-8-2014.

The Chairman requested the Dean, Faculty of Commerce, to present the recommendations of the Faculty of Commerce Meeting held on 7-8-2014.

The Dean presented the recommendations of the Faculty of Commerce Meeting held on 7-8-2014, with regard to introduction of Choice Based Credit System for P.G. courses in M.Com., M.F.A., M.I.B., M.T.A. and 5 years Integrated Course in M.T.A.

Resolution: The Academic Council resolved to approve the recommendations of the Faculty of Commerce Meeting held on 7-8-2014.

Item No.4: To consider the recommendations of the Faculty of Science Meeting held on 5-08-2014.

The Chairman requested the Dean, Faculty of Science, to present the recommendations of the Faculty of Science Meeting held on 5-08-2014.

The Dean, Faculty of Science informed the House that the Syllabus and Scheme of Examination were framed under Choice Based Credit System and requested to deliberate on the subject.

Resolution: The Academic Council resolved to approve the recommendations of the Faculty of Science Meeting held on 5-08-2014 and authorized the Dean, to incorporate the corrections if any, in the Syllabus and Scheme of Examinations.

Item No.5: To consider the recommendations of the Faculty of Arts Meeting held on 4-8-2014.

The Chairman requested the Dean, Faculty of Arts to present the recommendations of the Faculty of Arts Meeting held on 4-8-2014.

The Dean, Faculty of Arts informed the House that the Syllabus and Scheme of Examination were framed under Choice Based Credit System and requested to deliberate on the subject.

Resolution: The Academic Council resolved to approve the recommendations of the Faculty of Arts Meeting held on 4-8-2014 and authorized the Dean, to incorporate the corrections if any, in the Syllabus and Scheme of Examinations.

Item No.6: To consider the recommendations of the Faculty of Education Meeting held on 7-8-2014.

The Chairman requested the Dean, Faculty of Education, to present the recommendations of the Faculty of Education Meeting held on 7-8-2014.

The Dean, Faculty of Education informed the House that the Syllabus and Scheme of Examination were framed under the Choice Based Credit System and requested to deliberate on the subject.

Resolution; The Academic Council resolved to approve recommendations of the Faculty of Education Meeting held on 7-8-2014.

Item No.7: To consider modification to the existing regulation of B.Com. Degree Course from the academic year 2014-15.

The Dean, Faculty of Commerce informed the House that as per the request of the Chairman, Department of Commerce, has recommended the following modification to the

Regulation for admission to the B.Com. Degree Course from the academic year 2014-15 and requested the House to approve the same.

Existing	Modification sought
Candidates who have completed Two year Pre-University course of Karnataka State or its equivalent with Business Studies and Accountancy as two major subjects of study in both first and second year Pre-University are eligible for admission to this course.	Candidates who have completed Two years Pre-University course of Karnataka State or its equivalent with Business Studies and Accountancy as two major subjects of study at Pre-University level are eligible for admission to this course.

Resolution: ***The Academic Council resolved to approve the above mentioned modification to the Regulations with regard to eligibility for admission for B.Com. degree course to be effective from the academic year 2014-15.***

Item No.: 8 & 9: To consider promotion as Professor under UGC-Career Advancement Scheme for the Telugu/Kannada Language Teachers –reg.

The Vice-Chancellor informed the House that under UGC-Career Advancement Scheme with regard to promotion of Teachers under 19.4, the revised Regulations relating to Direct Recruitment and Career Advancement are as follows:

Statute :19.4: Besides the indexed publications documented by various discipline-specific databases, the University concerned shall draw through Committee(s) of subject experts and ISBN/ISSN experts (a) a comprehensive list of National/Regional level journals of quality in the concerned subject(s) and (b) a comprehensive list of vernacular language journals/ periodicals/ official publication volumes of language bodies and upload them on the University website which are to be updated periodically. At the time of assessing the quality of publications of the candidates during their appointments/promotions, the selection committees shall have to be provided with the above two lists which could be considered by the selection committees along with the other discipline-specific databases.

Accordingly, the Chairperson, Dept. of Telugu, had placed the matter before the Special Board of Studies and has submitted the proceedings of the Special Board of Studies in Telugu with regard to CAS promotions.

The Special Board of Studies has unanimously resolved to recommend to the University to consider the following as equivalent to books/journals without ISBN/ISSN Numbers for promotion of teachers to the post of Professors.

a) Registered Journals/books with Editorial Board.
b) Journals published by renowned researchers/academicians/philanthropists.
c) Journals published by reputed publishers over a period of ten years or prior to 2012.
d) Conference proceedings which are financially supported by the Universities/National bodies/Govt./UGC., etc.,
e) Articles published in Institutions like Sahitya Academi/ Folklore Society/DSERT/ Basavasmithi/CIL/Misimi/Shaitya Prathanam/Telugtejam/Kannada Sahitya Parishath/ University publications/ Telugu Vijnanasamithi/ Cultural Academics etc.,
f) Article published in journals which are cited in research thesis and referred journals etc.,
g) Journals/books recommend for UG/PG courses at University level.

JOURNALS: Papers published in Journals:

1. Misimi-samputi-19, sanchika-122, dec-2008
2. Telugu Tejam-samputi-1, sanchika-3, 4 Feb, March – 2009
3. Sahitya prasthanam, samputi-8, sankchika-43, June-2009

BOOKS: 1. Suvarna Karnataka male – 2007
2. Boji bheemanna sahityam jaatiya drukpatham – 2008
3. Acharya kolakaluri Enoch Sahityam paivimarsanam – 2009

Proceedings: 1. Telugu vani – Aidava akhila Bharata Telugu maha sabhala pratyeka sanchika – June - 2007

Resolution: ***After deliberation, the Academic Council resolved to approve proceedings of the Board of Studies in Telugu (PG) with regard to promotion as Professor under UGC – Career Advancement Scheme for Telugu Language Teachers.***

Under Any other Item:

The Dean, Faculty of Engineering informed the House about UVCE completing one hundred years of its existence in 2017. He requested the Hon'ble Vice-Chancellor to announce a suitable Developmental Model for this unique Institution.

The Vice-Chancellor in response to this, informed the House the details of his discussion with the Higher Education Minister and some distinguished Aluminies. He said that a Committee of Experts will have to be constituted to look into the Pros and Cons and suggest a suitable developmental Model suitable to a constituent College of the University, like U.V.C.E. This Committee will take into cognizance the views of all the stakeholders and the existing developmental proposals and will submit a comprehensive report to the University. Based on the recommendations of the report and the decision of this House, action will be taken for the developmental works of U.V.C.E.

The meeting concluded with thanks to the Chair.

REGISTRAR

VICE-CHANCELLOR

7601-BUP-200-copies-JAN-2015

Proposed Syllabus for B.Sc. Mathematics paper for 6 semesters under Choice Based Credit Scheme (CBCS)

Effective from the academic year 2014-2015

Department of Mathematics
Bangalore University

BANGALORE UNIVERSITY
DEPARTMENT OF MATHEMATICS

Date: 13-6-2014

PROCEEDINGS OF THE BOS (UG) IN MATHEMATICS

The meeting of the Board of Studies in UG Mathematics for the year 2014-15 was held on Friday, June 13, 2014 at 2-00 p.m. in the chambers of the Chairman. The following members attended the meeting:

1. Dr. Pradeep G. Siddheshwar	Chairman	
2. Dr. Gayatri Nataraj	Member	
3. Dr. Sudhakar H. R.	Member	
4. Shri Ashwartha Reddy M.	Member	
5. Shri Thajmull Pasha B.	Member	ABSENT
6. Shri Ramakrishnappa V.	Member	
7. Shri Narasimhamurthy A. G.	Member	
8. Smt. Madhulatha Moses	Member	
9. Shri Sethuram H. R.	Member	
10. Dr. S. Pranesh	External Member	
11. Shri Vittal V. Kulkarni	External Member	13/6/14

Agenda and resolution:

1. Discussion on the syllabus of mathematics papers of B.Sc. course

   The BOS had a discussion on the draft syllabus for three years of B.Sc. (six semesters) prepared by teachers and approved the same with a practical component (mathematics practicals with FOSS tools for programming). Further, the BOS authorizes the BOS (PG - mathematics) to deliberate and decide on the contents of the syllabus of B.Sc.(Honours) which is the same as that of I M.Sc. (Mathematics).
   The BOS also resolved to change the list of practical experiments each year.

2. Panel of examiners of UG (Mathematics) and UG (Engineering Mathematics).

   The committee approved the updated panel of examiners of the two UG courses.

CHAIRMAN

Copy to:
1. The PS to the Registrar, Bangalore University, Bangalore.

2. The PS to the Vice-chancellor, Bangalore University, Bangalore.

Structure of B.Sc. / B.Sc.(Hons.) – Mathematics papers

Subjects	Paper	Instruction hrs/week	Duration of Exam(hrs)	Marks			Credits
				IA	Exam	Total	
I Semester							
Mathematics paper with practicals of 3credits	Theory Prac.	4 3	3 3	30 15	70 35	100 50	2 1
II Semester							
Mathematics paper with practicals of 3credits	Theory Prac.	4 3	3 3	30 15	70 35	100 50	2 1
III Semester							
Mathematics paper with practicals of 3credits	Theory Prac.	4 3	3 3	30 15	70 35	100 50	2 1
IV Semester							
Mathematics paper with practicals of 3credits	Theory Prac.	4 3	3 3	30 15	70 35	100 50	2 1
V Semester							
Two Mathematics papers with practicals of 3 credits each	Theory Prac. Theory Prac.	3 3 3 3	3 3 3 3	30 15 30 15	70 35 70 35	100 50 100 50	2 1 2 1
VI Semester							
Two Mathematics papers with practicals of 3 credits each	Theory Prac. Theory Prac.	3 3 3 3	3 3 3 3	30 15 30 15	70 35 70 35	100 50 100 50	2 1 2 1

Note: The structure of the syllabus of mathematics paper of B. Sc. (Hons.) is included in the structure of M.Sc. (Mathematics) syllabus.

MISSION AND VISION OF THE NEW SYLLABUS IN MATHEMATICS

Mission

- Improve retention of mathematical concepts in the student.
- To develop a spirit of inquiry in the student.
- To improve the perspective of students on mathematics as per modern requirement.
- To initiate students to enjoy mathematics, pose and solve meaningful problems, to use abstraction to perceive relationships and structure and to understand the basic structure of mathematics.
- To enable the teacher to demonstrate, explain and reinforce abstract mathematical ideas by using concrete objects, models, charts, graphs, pictures, posters with the help of FOSS tools on a computer.
- To make the learning process student-friendly by having a shift in focus in mathematical teaching, especially in the mathematical learning environment.
- Exploit techno-savvy nature in the student to overcome math-phobia.
- Propagate FOSS (Free and open source software) tools amongst students and teachers as per vision document of National Mission for Education.
- To set up a mathematics laboratory in every college in order to help students in the exploration of mathematical concepts through activities and experimentation.
- To orient students towards relating Mathematics to applications.

Vision

- To remedy Math phobia through authentic learning based on hands-on experience with computers.
- To foster experimental, problem-oriented and discovery learning of mathematics.
- To show that ICT can be a panacea for quality and efficient education when properly integrated and accepted.
- To prove that the activity-centered mathematics laboratory places the student in a problem solving situation and then through self exploration and discovery habituates the student into providing a solution to the problem based on his or her experience, needs, and interests.
- To provide greater scope for individual participation in the process of learning and becoming autonomous learners.
- To provide scope for greater involvement of both the mind and the hand which facilitates cognition.
- To ultimately see that the learning of mathematics becomes more alive, vibrant, relevant and meaningful; a program that paves the way to seek and understand the world around them. A possible by-product of such an exercise is that math-phobia can be gradually reduced amongst students.
- To help the student build interest and confidence in learning the subject.

Support system for Students and Teachers in understanding and learning FOSS TOOLS:

As a national level initiative towards learning FOSS tools, IIT Bombay for MHRD, Government of India is giving free training to teachers interested in learning open source softwares like scilab, maxima, octave, geogebraand others.

(website: http://spoken-tutorial.org ; email: contact@spoken-tutorial.org ; info@spokentutorial.org)

NEW SYLLABUS

FIRSTSEMESTER

MATHEMATICS – I

(4 lecture hours per week+3 hours of practicals/week per batch of not more than 10 students)

(56 HOURS)

THEORY

1. ALGEBRA - I

Matrices

Elementary row and column transformations(operations), equivalent matrices, theorems on it. Row- reduced echelon form, Normal form of a matrix , Rank of a matrix, Problems.

Homogeneous and Non – Homogeneous systems of *m* linear equations in *n* unknowns consistency criterion – criterion for uniqueness of solutions. Solution of the same by elimination method.

Eigenvalues and Eigenvectors of a square matrix of order 2 and 3,standard properties, Cayley-Hamilton theorem (with proof). Finding A^{-1}, A^{-2} and A^2, A^3, A^4

(14 lecture hours)

2. CALCULUS - I

a) Differential Calculus

Successive Differentiation - n^{th} derivatives of the functions: e^{ax} , $(ax + b)^n$, log(ax + b), sin(ax + b) , cos(ax + b), $e^{ax}sin(bx+ c)$, $e^{ax}\cos(bx + c)$ – Problems

Leibnitz theorem (with proof) and its applications.

Partial differentiation –Function of two and three variables - First and higher derivatives - Homogeneous functions – derivatives- Euler's theorem and its extension (with proof) - Total derivative and differential - Differentiation of implicit functions and composite functions – Problems - Jacobians – Properties of Jacobians problems.

b) Integral Calculus

Reduction formulae for $\int \sin^n x\,dx$, $\int \cos^n x\,dx$, $\int \tan^n x\,dx$, $\int \cot^n x\,dx$, $\int \sec^n x\,dx$, $\int \operatorname{cosec}^n x\,dx$, $\int \sin^m x \cos^n x\,dx$, with definite limit. Differentiation under integral sign by Leibnitz rule.

(28 lecture hours)

3.GEOMETRY

Analytical Geometry Of Three Dimensions

Recapitulation of elements of three dimensional geometry - Different forms of equations of straight line and plane.

Angle between two planes - Line of intersection of two planes - Plane coaxal with given planes - Planes bisecting the angle between two planes - Angle between a line and a plane - Coplanarity of two lines - Shortest distance between two lines.

Equation of the sphere in general and standard forms - equation of a sphere with given ends of a diameter.Tangent plane to a sphere, orthogonallity of spheres.

Standard equations of right circular cone and right circular cylinder.

(14 lecture hours)

Note: All the derivations (book works) must be through vector methods with reduction to corresponding Cartesian equivalents.

Suggested distribution of lecture hours

1.Matrices: 1 hour perweek
2.Differential Calculus and Integral Calculus: 2 hours perweek
3. Analytic Geometry of three dimensions: 1 hour perweek.

Text Books/open source materials

1. Shanti Narayan and P K Mittal , Text book of *Matrices*, 5th edition, New Delhi, S Chand and Co. Pvt. Ltd.,2013.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. Shanthi Narayan and P K Mittal, *Analytical Solid Geometry*. New Delhi: S. Chand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. B S Vatssa, *Theory of Matrices*, New Delhi: New Age International Publishers, 2005.
2. A R Vashista, Matrices, Krishna Prakashana Mandir, 2003.
3. G B Thomasand R L Finney, *Calculus and analytical geometry,Addison Wesley, 1995.*

4. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
5. N P Bali, *Differential Calculus*, India: Laxmi Publications (P) Ltd.., 2010.
6. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.
7. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
8. S.P.Mahajan & Ajay Aggarwal, *Comprehensive Solid Geometry* , 1st ed.: Anmol Publications , 2000.

Useful web links:

1. http://www.cs.columbia.edu/~zeph/3203s04/lectures.html
2. http://home.scarlet.be/math/matr.htm
3. http://www.themathpage.com/
4. http://www.abstractmath.org/
5. http://ocw.mit.edu/courses/mathematics/
6. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
7. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
8. http://mathworld.wolfram.com/Calculus.html
9. http://ocw.mit.edu/courses/mathematics/
10. http://www.univie.ac.at/future.media/moe/galerie.html
11. http://mathworld.wolfram.com/AnalyticGeometry.html

PRACTICALS – I

Mathematics practicals with F*ree* and O*pen*S*ource* S*oftware* (FOSS) tools for computer programs
(3 hours/ weekper batch of not more than 10 students)

LIST OF PROBLEMS

1. Introduction to Scilab and commands connected with matrices.
2. Computations with matrices.
3. Row reduced echelon form and normal form.
4. Establishing consistency or otherwise and solving system of linear equations.
5. Introduction to Maxima and commands for derivatives and n^{th} derivatives.
6. Scilab and Maxima commands for plotting functions.
7. n^{th} derivative without Leibnitz rule.
8. n^{th} derivative with Leibnitz rule.
9. Obtaining partial derivative of some standard functions
10. Verification of Euler's theorem, its extension and Jacobian.
11. Maxima commands for reduction formula with or without limits.

12. Implementing vector form of line.
13. Implementing vector form of plane.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

SECOND SEMESTER
MATHEMATICS – II

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

(56 HOURS)

THEORY

1. ALGEBRA - II

Group Theory

Binary operation, algebraic structure-problems on finding identity and inverse. Definitions of semigroup and group, abelian group – problems on finite and infinite groups. Properties of group with proof – standard problems on groups – A finite semigroup with both the cancellation laws is a group – Any group of order less than five is abelian – permutation groups.

Subgroups- theorems on subgroups (with proof)- problems.

(14 lecture hours)

2. CALCULUS - II

a) Differential Calculus

Polar coordinates - Angle between the radius vector and the tangent - Angle of intersection of curves (polar form) polar sub-tangent and polar subnormal- perpendicular from pole on the tangent - Pedal equations. Derivative of an arc in Cartesian, parametric and polar forms.

Curvature of plane curves - formula for radius of curvature in Cartesian, parametric, polar and pedal forms - centre of curvature - evolutes. Singular points – Asymptotes – Envelopes. General rules for tracing of curves.

b) Integral Calculus

Applications of Integral Calculus: computation of length of arc, plane area and surface area and volume of solids of revolutions for standard curves in Cartesian and Polar forms.

(28 lecture hours)

4.DIFFERENTIAL EQUATIONS – I

Solutions of ordinary differential equations of first order and first degree:

(i) Linear equations, Bernoulli equation and those reducible to these.

(ii) Exact equations(excluding reducible to Exact)

Equations of first order and higher degree – non linear first order, higher degree – (Mention) solvable for p - solvable for y - solvable for x - Clairaut's equation -

singular solution - Geometric meaning.Orthogonal trajectories in Cartesian and polar forms.

(14 lecture hours)

Suggested distribution of lecture hours

1. Algebra-II (Group theory) : 1 hour / week
2. Calculus-II (Differential calculus & Integral Calculus): 2 hours / week.
3. Differential Equations-I: 1 hour / week.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
3. Shanthi Narayan and P K Mittal, *Integral Calculus*, Reprint. New Delhi: S. Chand and Co. Pvt. Ltd., 2013.
4. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd.., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II, 1996.

9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
10. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill., 2009.
11. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.
12. F Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
13. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
14. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://www.univie.ac.at/future.media/moe/galerie.html
9. http://tutorial.math.lamar.edu/classes/de/de.aspx
10. http://www.sosmath.com/diffeq/diffeq.html
11. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PRACTICALS –II

Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Creating a Scilab program (simple examples).
2. Creating a Maxima program (simple examples).
3. i. Verifying whether given operator is binary or not.
   ii. To find identity element of a group.
   iii.To find inverse element of a group.
4. Finding all possible subgroups of a finite group.
5. Plotting of standard Cartesian curves using Scilab/Maxima.
6. Plotting of standard Cartesian curves using Scilab/Maxima.

7. Plotting of standard Polar curves using Scilab/Maxima.
8. Plotting of standard parametric curves using Scilab/Maxima.
9. Scilab/Maxima programs for area and volume.
10. Solution of Differential equation using Scilab/Maxima and plotting the solution-I.
11. Solution of Differential equation using Scilab/Maxima and plotting the solution-II.
12. Solution of Differential equation using Scilab/Maxima and plotting the solution-III.
13. Solution of Differential equation using Scilab/Maxima and plotting the solution-IV.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics).

THIRD SEMESTER
MATHEMATICS-III

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

(56 HOURS)

THEORY

1. ALGEBRA - III

Groups

Order of an element of a group – properties related to order of an element- subgroup generated by an element of a group –coset decomposition of a group, Cyclic groups- properties- modulo relation- index of a group –Lagrange's theorem- consequences.

(14 lecture hours)

2. ANALYSIS – I

a) Sequences Of Real Numbers

Definition of a sequences-Bounded sequences- limit of a sequences- convergent, divergent and oscillatory sequences- Monotonic sequences and their properties- Cauchy's criterion.

b) Series Of Real Numbers

Definition of convergence, divergence and oscillation of series -properties of Convergence series - properties of series of positive terms – Geometric series Tests for convergence of series -p- series - comparison of series Cauchy's root Test -D Alembert's test. Raabe's test ,- Absolute and conditional convergence-D' Alembert test for absolute convergence - Alternating series - Leibnitz test.

Summation of binomial, exponential and logarithmic series.(28 lecture hours)

3. CALCULUS - III

Differential Calculus

Recapitulation of Equivalence Class and partition of a set. Definition of the limit of a function in ε-δ form –continuity- types of discontinuities. Properties of continuous function on a closed interval (boundedness, attainment of bounds and taking every value between bounds). Differentiability -Differentiability implies Continuity – Converse not true. Rolle's Theorem- Lagrange's and Cauchy's First Mean Value Theorem (Lagrange's form) - Maclaurin's expansion. Evaluation of limits by L' Hospital's rule (14 lecture hours)

Suggested distribution of lecture hours

1. Algebra – III (Groups): 1 hour / week.
2. Analysis-I (sequences of real numbers and series of real numbers):2 hours /week
3. Calculus - III(differential calculus): 1 hour / week.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.
3. S.C.Malik and Savita Arora, *Mathematical Analysis*, 2nd ed. New Delhi, India: New Age international (P) Ltd., 1992
4. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: SChand and Co. Pvt. Ltd., 2014.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.
2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. Richard R Goldberg, *Methods of Real Analysis*, Indian ed. New Delhi, India: Oxford and IBH Publishing Co., 1970.

6. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
7. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
8. N P Bali, *Differential Calculus*, New ed. New Delhi, India: Laxmi Publications (P) Ltd.., 2010.
9. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.
10. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
11. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill., 2009.

Usefulweb links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://www.math.unl.edu/~webnotes/contents/chapters.htm
5. http://www-groups.mcs.st-andrews.ac.uk/~john/analysis/index.html
6. http://web01.shu.edu/projects/reals/index.html
7. http://www.mathcs.org/analysis/reals/index.html
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/

PRACTICALS –III

Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Examples to verify Lagrange's theorem.
2. Examples for finding left and right coset and finding the index of a group.
3. Illustration of convergent, divergent and oscillatory sequences using Scilab/Maxima.
4. Illustration of convergent, divergent and oscillatory series using Scilab/Maxima.
5. Scilab/Maxima programs to find the sum of the series and its radius of convergence.
6. Using Cauchy's criterion to determine convergence of a sequence (simple examples).
7. Using Cauchy's criterion on the sequence of partial sums of the series to determine convergence of a series.

8. Testing the convergence of binomial, exponential and logarithmic series and finding the sum.
9. Scilab/Maxima programs to illustrate continuity of a function.
10. Scilab/Maxima programs to illustrate differentiability of a function and unequal left hand and right hand limits for discontinuous functions.
11. Scilab/Maxima programs to verify Rolle's theorem and Lagrange's theorem.
12. Scilab/Maxima programs to verify Cauchy's mean value theorem and finding Taylor's theorem for a given function.
13. Evaluation of limits by L'Hospital's rule using Scilab/Maxima.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

FOURTH SEMESTER

MATHEMATICS - IV

(4 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

(56 HOURS)

THEORY

1. ALGEBRA –IV

Groups

Normal subgroups-examples and problems –Quotient group-Homomorphism and Isomorphism of groups-Kernel and image of a homomorphism-Normality of the Kernel-Fundamental theorem of homomorphism- properties related to isomorphism-Permutation group-Cayley's theorem.

(14 lecture hours)

2. ANALYSIS -II

Fourier Series

Trigonometric Fourier series of functions with period 2π and period $2L$ – Half range Cosine and sine series.

(9 lecture hours)

3. CALCULUS - IV

Differential Calculus

Continuity and differentiability of a function of two and three variables – Taylor's Theorem and expansion of functions of two variables- Maxima and Minima of functions Of two variables. Method of Lagrange multipliers. (9 lecture hours)

4. MATHEMATICAL METHODS - I

Definition and basic properties Laplace transform of some common functions and Standard results –Laplace transform of periodic functions- Laplace transforms ,of derivatives And the integral of function- Laplace transforms, Heaviside function

convolution theorem (statement only) Inverse Laplace transforms.

(10 lecture hours)

5. DIFFERENTIAL EQUATIONS –II

Second and higher order ordinary linear differential equations with constant Coefficients- complementary function- particular integrals (standard types) Cauchy-Euler differential equation. Simultaneous linear differential equations (two variables) with constant coefficients. Solutions of second order ordinary linear differential equations with variables coefficients by the following methods.

(i). When a part of complementary function is given
(ii). Changing the independent variable
(iii). Changing the dependent variable
(iv). Variation of parameters
(v). Conditions for exactness and the solution when the equation is exact.

(14 lecture hours)

Suggested distribution of lecture hours

1. Algebra – IV (Rings ,Fields and Integal domains): 1 hour / week
2. Analysis – II (Fourier series), Calculus-IV (Differential Calculus) and Mathematical methods-I (Laplace transform): 2 hours / week.
3. Differential Equations II: 1 hour / week.

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Boumslag and Chandler, *Schaum's outline series on groups*, 2010.
3. Erwin Kreyszig, *Advanced Engineering Mathematics*, 8th ed. New Delhi, India: Wiley India Pvt. Ltd., 2010.
4. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
5. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
6. www.scilab.org.
7. **wxmaxima**.sourceforge.net
8. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.

2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
6. J Edwards, *An elementary treatise on the differential calculus: with applications and numerous example*, Reprint. Charleston, USA: BiblioBazaar, 2010.
7. N P Bali, *Differential Calculus*, Laxmi Publications (P) Ltd.., 2010.
8. S Narayanan & T. K. Manicavachogam Pillay, *Calculus*.: S. Viswanathan Pvt. Ltd., vol. I & II1996.
9. Frank Ayres and Elliott Mendelson, *Schaum's Outline of Calculus*, 5th ed. USA: Mc. Graw Hill., 2008.
10. E Spiegel, *Schaum's Outline of AdvancedCalculus*, 5th ed. USA: Mc. Graw Hill., 2009.
11. Raisinghania M.D., *Laplace and Fourier Transforms*. New Delhi, India: S. Chand and Co. Ltd. , 1995.
12. M D Raisinghania, Advanced Differential Equations, S Chand and Co. Pvt. Ltd., 2013.
13. FAyres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 2010.
14. S Narayanan and T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
15. G F Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://www.fourier-series.com/
4. http://mathworld.wolfram.com/
5. http://www.princeton.edu/~rvdb
6. http://www.zweigmedia.com/RealWorld/Summary4.html
7. http://ocw.mit.edu/courses/mathematics/
8. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
9. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
10. http://mathworld.wolfram.com/Calculus.html
11. http://ocw.mit.edu/courses/mathematics/
12. http://www.univie.ac.at/future.media/moe/galerie.html
13. http://tutorial.math.lamar.edu/classes/de/de.aspx
14. http://www.sosmath.com/diffeq/diffeq.html
15. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PRACTICALS –IV
Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Illustrating homomorphism and isomorphism of groups.
2. Verification of Normality of a given subgroup.
3. Verifying Cayley's theorem and isomorphism theorems.
4. To plot periodic functions with period 2π and 2L.
5. To find full range trigonometric Fourier series of some simple functions with period 2π and 2L.
6. Plotting of functions in half-range and including their even and odd extensions.
7. To find the half-range sine and cosine series of simple functions.
8. Finding maxima/minima of functions of two variables.
9. Finding the Laplace transforms of some standard functions.
10. Finding the inverse Laplace transform of simple functions.
11. Implementing Laplace transform method of solving ordinary linear differential equations of first and second order with constant coefficient.
12. Finding complementary function and particular integral of constant coefficient second and higher order ordinary differential equations.
13. Finding complementary function and particular integral of constant coefficient second and higher order ordinary differential equations.

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FIFTH SEMESTER

MATHEMATICS V

(3 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

THEORY(42 hours)

1. ALGEBRA - IV

Rings, Integral Domains, Fields

Rings, Types of Rings properties of rings – Rings of integers modulo n – Subrings – Ideals ,Principal, Prime and Maximal ideals in a commutative ring – examples and standard properties following the definition – Homomorphism, Isomorphism – Properties – Quotient rings – Integral Domain- Fields - properties following the definition – Fundamental Theorem of Homomorphism of Rings - Every field is an integral domain – Every finite integral domain is a field – Problems.

(14 lecture hours)

2. CALCULUS - V

Differential Calculus Of Scalar And Vector Fields

Scalar field – gradient of a scalar field, geometrical meaning – directional derivative – Maximum directional derivative – Angle between two surfaces - vector field – divergence and curl of a vector field – solenoidal and irrotational fields – scalar and vector potentials – Laplacian of a scalar field – vector identities. Standard properties, Harmonic functions, Problems.

(14 lecture hours)

3. NUMERICAL METHODS - I

Finite differences – Definition and properties of $\Delta, \nabla, \delta, \mu$ and E, the relation between them – The nth differences of a polynomial, Factorial notations, separation of symbols, divided differences and related theorems.

Newton –Gregory forward and backward interpolation formulae – Lagrange's and Newton's interpolation formulae for unequal intervals - Inverse interpolation.

Numerical Integration: Quadrature formula – Trapezoidal rule -Simpon's 1/3 and 3/8 rule(without proofs) and problems.

(14 lecture hours)

Suggested distribution of lecture hours.

1. Algebra IV: 1 hour /week.
2. Calculus-V (Differential calculus of scalar and vector fields): 1 hours/week
3. Numerical Methods I : 1 hours/week

Text Books/open source materials

1. Herstein I N, *Topics in Algebra*, 4th ed. New Delhi, India: Vikas Publishing House Pvt. Ltd, 1991.
2. Shanthi Narayan and P K Mittal, *Differential Calculus*, Reprint. New Delhi: S Chand and Co. Pvt. Ltd., 2014.
3. M D Raisinghania, *Vector calculus*,S Chand Co. Pvt. Ltd., 2013.
4. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
5. www.scilab.org.
6. **wxmaxima**.sourceforge.net
7. www.geogebra.org

Reference Books

1. Michael Artin, *Algebra*, 2nd ed. New Delhi, India: PHI Learning Pvt. Ltd., 2011.

2. Vashista, *A First Course in Modern Algebra*, 11th ed.: Krishna Prakasan Mandir, 1980.
3. John B Fraleigh, *A First course in Abstract Algebra*, 3rd ed.: Narosa Publishing House., 1990.
4. R Balakrishan and N.Ramabadran, *A Textbook of Modern Algebra*, 1st ed. New Delhi, India: Vikas publishing house pvt. Ltd., 1991.
5. G B Thomasand R L Finney, *Calculus and analytical geometry, Addison Wesley, 1995.*
6. B Spain,*Vector Analysis* , ELBS, 1994.
7. D E Bournesand, P C Kendall, *Vector Analysis,* ELBS, 1996.
8. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India,2012.

Useful web links:

1. http://www.themathpage.com/
2. http://www.abstractmath.org/
3. http://ocw.mit.edu/courses/mathematics/
4. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
5. http://ocw.mit.edu/OcwWeb/Mathematics/18-01Fall-2005/CourseHome/index.htm
6. http://mathworld.wolfram.com/Calculus.html
7. http://www.univie.ac.at/future.media/moe/galerie.html
8. http://www.math.gatech.edu/~harrell/calc/
9. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
10. http://math.fullerton.edu/mathews/numerical.html
11. http://www.onesmartclick.com/engineering/numerical-methods.html

PRACTICALS –V

Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Examples on different types of rings.
2. Examples on integral domains and fields.
3. Examples on subrings, ideals and subrings which are not ideals.
4. Homomorphism and isomorphism of rings- illustrative examples.
5. To demonstrate the physical interpretation of gradient, divergence and curl.
6. Writing gradient, divergence, curl and Laplacian in cylindrical coordinates.
7. Writing gradient, divergence, curl and Laplacian in spherical coordinates.
8. Using cyclic notations to derive different vector identities.
9. Using cyclic notations to derive some more vector identities.
10. Scilab/Maxima programs on Interpolations with equal intervals.
11. Scilab/Maxima programs on Interpolations with unequal intervals.

12. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{1}{3}^{rd}$ rule.

13. Scilab/Maxima programs to evaluate integrals using Simpson's $\frac{3}{8}^{th}$ rule.

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FIFTH SEMESTER
MATHEMATICS – VI

(3 lecture hours per week+ 3 hours of practicals/week per batch of not more than 10 students)

(42 HOURS)

THEORY

1. MATHEMATICAL METHODS - II

Calculus Of Variation

Variation of a function $f = f(x, y, y')$ – variation of the corresponding functional – extremal of a functional – variational problem – Euler's equation and its particular forms – Examples – standard problems like geodesics, minimal surface of revolution, hanging chain, Brachistochrone problem –Isoperimetric problems.

(14 Lecture hours)

2. CALCULUS – VI

a). Line And Multiple Integrals

Definition of line integral and basic properties examples evaluation of line integrals.

Definition of double integral – its conversion to iterated integrals .Evaluation of double integrals by change of order of integration and by change of variables – computation of plane and surface areas ,volume underneath a surface and volume of revolution using double integrals.

Definitionof triple integral and evaluation – change of variables – volume as a triple integral .

(18lecture hours)

b). Integral Theorems

Green's theorem (with proof) - Direct consequences of the theorem.The Divergence theorem (with proof) - Direct consequences of the theorem.The Stokes' theorem (with proof) - Direct consequences of the theorem.

(10 lecture hours)

Suggested distribution of lecture hours

1. Mathematical Methods II (Calculus of variation): 1 hour /week.
2. Calculus VI (Line and Multiple Integrals and Integral theorems): 2 hours/week

Text Books/open source materials

1. R Weinstock,*Calculus of Variation*, Dover, 1970.
2. M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
3. www.scilab.org
4. **wxmaxima**.sourceforge.net
5. www.geogebra.org

Reference Books

1. F B Hildebrand, *Methods in Applied Mathematics,*
2. B Spain,*Vector Analysis* , ELBS, 1994.
3. D E Bournesand, P C Kendall, *Vector Analysis,* ELBS, 1996.

Useful web links:

1. http://ocw.mit.edu/courses/mathematics/
2. http://planetmath.org/encyclopedia/TopicsOnCalculus.html
3. http://mathworld.wolfram.com/Calculus.html
4. http://www.univie.ac.at/future.media/moe/galerie.html
5. http://www.math.gatech.edu/~harrell/calc/

PRACTICALS –VI

Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Example on Euler's equation in full form.
2. Example on particular forms of Euler's equation.
3. Examples on minimum surface of revolution and Brachistochrome problem.
4. Examples on Isoperimetric problems.
5. Evaluation of the line integral with constant limits.
6. Evaluation of the double integral with constant limits.
7. Evaluation of the triple integral with constant limits.
8. Evaluation of the line integral with variable limits.
9. Evaluation of the double integral with variable limits.
10. Evaluation of the triple integral with variable limits.
11. Verifying Green's theorem.
12. Verifying Gauss divergence theorem.
13. Verifying Stokes' theorem

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SIXTH SEMESTER
MATHEMATICS - VII

(3 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

(42 HOURS)

THEORY

1. ALGEBRA –V

Linear Algebra

Vector space – Examples – Properties – Subspaces – criterion for a subset to be a subspace –linear span of a set - linear combination – linear independent and dependent subsets – Basis and dimensions– Standard properties – Examples illustrating concepts and results.

Linear transformations – properties – matrix of a linear transformation – change of basis – range and kernel – rank and nullity – Rank – Nullity theorem – Non-singular and singular linear transformations - Standard properties – Examples.

(14 lecture hours)

2. DIFFERENTIAL EQUATIONS III

a). Orthogonal Curvilinear Coordinates

Definition of orthogonal curvilinear coordinates. Fundamental vectors or base vectors, Scale factors or material factors - quadratic differential form. Spherical curvilinear system : Cartesian, Cylindrical – conversion of Cylindrical to orthogonal Spherical polar coordinates. Theorem: The Spherical coordinate system is orthogonal curvilinear coordinate system. (without proof) No problems on conversions of one system to another.

b). Partial Differential Equations

Total differential equations-Necessary condition for the equation $Pdx+ Qdy+Rdz= 0$ to be integrable-Simultaneous equations of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$

Formation of partial differential equation .Equations of First Order Lagrange's linear equation – Charpit's method, Standard types of first order non-linear partial differential equation (By known substitution).

Solution of second order linear partial differential equations in two variables with constant coefficients by finding complementary function and particular integral

Solution of one – dimensional heat equations, Solution of one – dimensional wave equations using Fourier series.

(28 lecture hours)

Suggested distribution of lecture hours:

1. Algebra-V (Linear Algebra) : 1 hours / week.
2. Differential Equations III: 2 hours / week

Text Books/open source materials

1. Krishnamoorty V K and Mainra V P and Arora J L, *An Introduction to Linear Algebra*, Reprint. New Delhi, India: Affiliated East West Press Pvt. Ltd., 2003.
2. M. D. Raisinghania, *Vector Calculus,* S Chand Co. Pvt. Ltd., 2013.
3. M D Raisinghania, Ordinary and Partial Differential Equations, S Chand and Co. Pvt. Ltd., 2014.
4. www.scilab.org
5. **wxmaxima**.sourceforge.net
6. www.geogebra.org

Reference Books

1. G Strang, MIT open courseware (http://ocw.mit.edu/courses).
2. B Spain, *Vector Analysis* , ELBS, 1994.
3. D E Bournes and, P C Kendall, *Vector Analysis,* ELBS, 1996.
4. Frank Ayres, *Schaum's outline of theory and problems of Differential Equations*, 1st ed. USA: McGraw-Hill, 1972.
5. GF Simmons, *Differential equation with Applications and historical notes*, 2nd ed.: McGraw-Hill Publishing Company, Oct 1991.
6. S Narayanan & T K Manicavachogam Pillay, *Differential Equations*.: S V Publishers Private Ltd., 1981.
7. I N Sneddon, *Elements of Partial Differential Equations*, 3rd ed.: Mc. Graw Hill., 1980.

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1. http://ocw.mit.edu/courses/mathematics/
2. http://mathworld.wolfram.com/Calculus.html
3. http://www.math.gatech.edu/~harrell/calc/
4. http://tutorial.math.lamar.edu/classes/de/de.aspx
5. http://www.sosmath.com/diffeq/diffeq.html
6. http://www.analyzemath.com/calculus/Differential_Equations/applications.html

PRACTICALS –VII

Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. i. Vector space, subspace – illustrative examples.
   ii. Expressing a vector as a linear combination of given set of vectors.
   iii. Examples on linear dependence and independence of vectors.
2. i. Basis and Dimension – illustrative examples.
   ii. Verifying whether a given transformation is linear.

3. i. Finding matrix of a linear transformation.
   ii. Problems on rank and nullity.
4. Plotting of cylinder and cone using orthogonal curvilinear coordinates.
5. Plotting of sphere using orthogonal curvilinear coordinates.
6. Solutions to the problems on total and simultaneous differential equations.
7. Solutions to the problems on different types of Partial differential equations.
8. Solving second order linear partial differential equations in two variables with constant coefficient.
9. Solving some more second order linear partial differential equations in two variables with constant coefficient.
10. Solution of one dimensional heat equation using Fourier series with Dirichlet condition.
11. Solution of one dimensional heat equation using Fourier series with Neumann condition.
12. Solution of one dimensional wave equation using Fourier series with Dirichlet condition.
13. Solution of one dimensional wave equation using Fourier series with Neumann condition.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

SIXTH SEMESTER
MATHEMATICS - VIII

(3 lecture hours per week+ 3 hours of practicals /week per batch of not more than 10 students)

(42 HOURS)

THEORY

1. ANALYSIS - III

Complex Analysis

Complex numbers-Cartesian and polar form-geometrical representation-complex-Plane-Euler's formula- $e^{i\theta} = \cos\theta + i\sin\theta$.Functions of a complex variable-limit, continuity and differentiability of a complex function. Analytic function Cauchy-Riemann equations in Cartesian and Polar forms-Sufficiency conditions for analyticity(Cartesian form only)-Harmonic function-standard properties of analytic functions-construction of analytic function when real or imaginary part is given-Milne Thomson method.

Complex integration-the complex integration –properties-problems.Cauchy's Integral theorem-proof using Green's theorem- direct consequences.Cauchy's Integral formula with proof-Cauchy's generalised formula for the derivatives with proof and

applications for evaluation of simple line integrals - Cauchy's inequality with proof – Liouville's theorem with proof. Fundamental theorem of algebra with proof.

Transformations – conformal transformation – some elementary transformations namely Translation,rotation,magnification and inversion - examples.

The bilinear transformation (B.T.)-cross ratio-invariant points of a B.T.-properties-

(i) B.T. sets up a one to one correspondence between the extended z-plane and the extended w-plane.

(ii) Preservation of cross ratio under a B.T.

(iii) A B.T. transforms circles onto circles or straight lines.

Problems on finding a B.T., and finding images under a B.T.and invariant points of a B.T. Discussion of transformations $w = z^2$, $w = \sin z$, $w = \cosh z$ and $w = e^z$.

(28 lecture hours)

2. NUMERICAL METHODS – II

Numerical solutions of algebraic and Transcendental equations – method of successive bisection - method of false position – Newton-Raphson method. Numerical solutions of non-Homogeneous system of linear algebraic equations in three variables by Jacobi's method and Gauss-Seidel method.Computation of largest Eigen value of a square matrix by power method.

Solutions of initial value problems for ordinary linear first order differential equations by Taylor's series,Euler's and Euler's modified method and Runge-Kutta 4^{th} ordered method.

(14 lecture hours)

Suggested distribution of lecture hours:

1. Analysis-III (Complex Analysis): 2 hours / week.
2. Numerical Methods-II: 1 hour / week

Text Books/open source materials

1. S Shanthinarayan, *Complex Analysis*, S Chand Co. Pvt. Ltd., 2012.
2. M K Jain, S R K Iyengar, and R K Jain, *Numerical Methods for Scientific and Engineering Computation*, 4th ed. New Delhi, India: New Age International, 2012.
3. www.scilab.org
4. **wxmaxima**.sourceforge.net
5. www.geogebra.org

Reference Books

1. R V Churchil & J W Brown, *Complex Variables and Applications*, 5th ed.: McGraw Hill Companies., 1989.
2. L V Ahlfors, *Complex Analysis*, 3rd ed.: Mc Graw Hill. , 1979.
3. A R Vashista, *Complex Analysis*, Krishna Prakashana Mandir, 2012.
4. S S Sastry, *Introductory methods of Numerical Analysis*, Prentice Hall of India, 2012.

Useful web links:

1. http://www.mathcs.org/analysis/reals/index.html
2. http://www.amtp.cam.ac.uk/lab/people/sd/lectures/nummeth98/index.htm
3. http://math.fullerton.edu/mathews/numerical.html
4. http://www.onesmartclick.com/engineering/numerical-methods.html

PRACTICALS –VIII
Mathematics practicals with FOSS tools for computer programs
(3 hours/ week per batch of not more than 10 students)

LIST OF PROBLEMS

1. Some problems on Cauchy-Riemann equations (polar form).
2. Implementation of Milne-Thomson method of constructing analytic functions(simple examples).
3. Illustrating orthogonality of the surfaces obtained from the real and imaginary parts of an analytic function.
4. Verifying real and imaginary parts of an analytic function being harmonic (in polar coordinates).
5. Illustrating the angle preserving property in a transformation.
6. Illustrating that circles are transformed to circles by a bilinear transformation.
7. Examples connected with Cauchy's integral theorem.
8. Solving algebraic equation (Bisection method).
9. Solving algebraic equation (Regula-Falsiand Newton-Raphson methods).
10. Solving system of equations (Jacobi and Gauss-Seidel methods).
11. Solving for largest eigenvalue by Power method.
12. Solving ordinary differential equation by modified Euler's method.
13. Solving ordinary differential equation by Runge-Kutta method of 4^{th} order.

Note: The above list may be changed annually with the approval of the BOS in UG (Mathematics). Geogebra/Octave may also be used in place of scilab/maxima.

BANGALORE UNIVERSITY

SUBJECT: ELECTRONICS

Regulations and Scheme of Study for the B Sc (Electronics) course
[From 2014 – 15]

Preamble:

Bangalore University wishes to initiate qualitative and substantial changes to its UG program. One step towards this is to introduce the Credit Based Choice System in all its programs.

The rules governing the CBCS (semester scheme) UG program are as per the university guidelines.

The course structure has been detailed in Appendix – 1 and syllabus in Appendix – 2.

APPENDIX – 1

BANGALORE UNIVERSITY
DETAILS OF COURSE PATTERN AND SCHEME OF EXAMINATION
B Sc, CBCS (semester) SCHEME
Subject: **ELECTRONICS**

Semester/ Teaching hours	*Title of the Paper*	*Hours / week*		*Exam. marks /paper*				*Duration of Exam. (hours)*		*Total marks /paper*	*CREDITS*
				Theory		*Practical*					
		Theory	*Practical*	*Exam*	*I.A*	*Exam*	*I.A*	*Theory*	*Practical*		
Semester I (56 hours)	*Basic Electronics (EL-101T and EL-101P)*	*4*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*1×2+ 1×1= 3*
Semester II (56 hours)	*Electronic Circuits & Special Purpose devices (EL-201T and EL-201P)*	*4*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*
Semester III (56 hours)	*Linear Integrated Circuits & C Programming (EL-301T and EL-301P)*	*4*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*
Semester IV (56 hours)	*Digital Electronics & Verilog (EL-401T and EL-401P)*	*4*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*
Semester V (42 +42 hours)	*Communication I (EL-501T and EL-501P)*	*3*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*1×2+ 1×1= 3*
	Microprocessors & Instrumentation (EL-502T and EL-502P)	*3*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*
Semester VI (42 +42 hours)	*Communication II (EL-601T and EL-601P)*	*3*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*
	Microcontrollers (EL-602T and EL-602P)	*3*	*3*	*70*	*30*	*35*	*15*	*3*	*3*	*150*	*3*

Note: Internal assessment marks will be based on attendance, assignment & tests.
In addition to this, internal assessment marks may be awarded marks for the report submitted by the students towards industrial visits /field visits/study tour in the 5th or 6th semester.

APPENDIX - 2

B.Sc. Electronics Syllabus

Semester I – Paper 1

EL-101T BASIC ELECTRONICS

Unit 1: **10 hours**

DC and AC response of electronic passive components

Review of passive components – R, L & C

Voltage and current sources–ideal and practical, conversion from voltage source to current source and vice versa, numerical problems.

Transient analysis of RC and RL circuits: Series RC circuit excited by DC source- charging& discharging of a capacitor through resistor- circuit diagram and qualitative study, charge/voltage at any instant during charging and discharging–equations (mention only - no derivations), graphical representation, RC time constant, numerical problems.

Series RL circuit excited by DC source: circuit diagram and qualitative study, current at any instant during growth and decay–equations (mention only - no derivations), graphical representation, RL time constant, numerical problems.

AC applied to Series RC and RL circuits: Impedance of series RC & RL circuits (qualitative study-no derivations), Numerical problems.

AC applied to Series and parallel RLC circuit(qualitative study–no derivations), series and parallel resonance, condition for resonance, resonant frequency, band width, significance of quality factor, numerical problems.

Transformer: Principle, construction and working

Switches: SPST, SPDT, DPST and DPDT, fuse and electromagnetic relay, MCB and ELCB, RCCB– brief note on each.

Unit 2: **09 hours**

Network theorems (DC analysis only)

Review of Ohms law, Kirchhoff's laws, voltage divider and current divider theorems, open and short circuits.

Thevenin's theorem, Norton's theorem and interconversion, superposition theorem –statements and steps involved, reciprocity theorem– statement, maximum power transfer theorem-derivation, numerical problems on all theorems.

Unit 3: **12 hours**

Semiconductor Diode and its applications

Review of PN junction diode and characteristics, ideal diode and diode approximations – representations. Block diagram of a Regulated Power Supply, Rectifiers – HWR, FWR-center tapped and bridge FWRs. Circuit diagrams, working and waveforms, ripple factor & efficiency(no derivations), comparison and numerical problems. Filters– types, circuit diagram and explanation of shunt capacitor filter with waveforms.

Zener diode regulator– circuit diagram and explanation for load and line regulation, numerical problems on load regulation, disadvantages of Zener diode regulator.

Transistor series regulator – circuit diagram and working.

Unit 4: **13 hours**

BJT and FET

Bipolar Junction Transistor: Construction, principle & working of NPN transistor, terminology. Configuration – CE, CB, CC (mention only). Definition of α, β and γ and their interrelations, leakage currents(mention only), numerical problems.

Study of CE Characteristics - different regions. Experimental circuit and procedure.

Study of CB Characteristics - different regions, Base width modulation-Early effect.

Hybrid parameters –definitions of h_{ie}, h_{oe}, h_{fe} and h_{re}

Transistor biasing – need for biasing, DC load line, operating point, thermal runaway, stability and stability factor (mention the equation-no derivation).

Different types of biasing– Fixed bias(base bias) without and with R_E, collector to base bias, voltage divider bias and emitter bias ($+V_{CC}$ and $-V_{EE}$ bias) –circuit diagrams and their working, Q point expressions for voltage divider biasing only with numerical problems.

Transistor as a switch – circuit and working**.** Darlington pair and its applications (mention only).

Junction Field Effect Transistor (JFET) – types (mention only), construction and working of N channel FET, characteristics, FET parameters and their relationships, comparison of FET with BJT.

Unit 5: **12 hours**

Number systems & Codes

Binary, hexadecimal – conversion from binary to decimal and vice-versa, binary to hexadecimal and vice-versa, decimal to hexadecimal and vice versa, addition and subtraction of binary numbers and hexadecimal numbers. Subtraction using 2's complement, signed number arithmetic – addition. Types of codes–BCD code, gray code, gray to binary conversion and vice versa, excess – 3 Code - self complementing property, ASCII and EBCDIC.

Text books:

1. A Text book of Electronics, R.S.Sedha, S Chand and Co., Multicolour,3rd edition , 2012.
2. Electronic Principles , Albert Malvino& David J Bates, TMH, 7th edition-2010
3. Introductory circuit analysis, Robert Boylstead, PHI 5th edition-2010.

Reference books:

1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electric circuits, JoesephEdminister, Schaums series.
5. Electric circuits Book 1,Schaums series - Syed. A. Nasar. Mc-Graw hill edition.
6. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C Gupta-TMH.
7. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
8. Principles of Electronics By V.K. Mehta, S.Chand& Co.
9. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.

Semester I - Practical I
EL-101P BASIC ELECTRONICS LAB

PART A (Demonstration experiments- not for evaluation)

1. Identification of Electronic Components and their circuit symbols.
2. Familiarisation of Electronic instruments: Digital Multimeter, DC Regulated Power Supply-fixed and variable, Function Generator and C.R.O.

PART B (Experiments to be performed)

1. Series resonance
2. Verification of Thevenin's theorem
3. Verification of Super position theorem
4. Verification of Maximum power transfer theorem.
5. V-I Characteristics of a Zener diode.
6. Half wave Rectifier – without and with shunt capacitance filter.
7. Centre tapped full wave rectifier – without and with shunt capacitance filter.
8. Zener diode as voltage regulator – load and line regulation.
9. Transistor characteristics in CE mode – determination of r_i, r_o and β.
10. Transistor characteristics in CB mode – determination of r_i and α.
11. Design and study of voltage divider biasing.
12. Study of emitter biasing.

Note: Minimum of 8 experiments to be performed

B.Sc. Electronics Syllabus

Semester II – Paper 2

EL-201T ELECTRONIC CIRCUITS AND SPECIAL PURPOSE DEVICES

Unit 1: 12 hours

Small Signal Amplifiers

Classification of amplifiers based on different criteria, small signal CE amplifier–circuit, working, frequency response, r_e model for CE configuration, derivation for Av, expressions for Z_{in} and Z_{out}. Numerical problems on A_v, Z_{in} and Z_{out}. Swamped amplifier and CC amplifier – circuit diagrams & applications (mention only).

Multistage amplifiers– qualitative study of cascaded stages, overall gain of multistage amplifier, loading Effect. Numerical problems on $A=A_1 \times A_2$. Types of coupling–RC coupled, transformer coupled and direct coupled (only circuit diagrams and frequency response graph, advantages and disadvantages for each). Darlington amplifier-circuit diagram and its characteristic features.

JFET amplifier in CS mode – circuit and operation, equivalent circuit and expression for voltage gain (derivation).Numerical problems.

Unit 2: 9 hours

Power and Tuned amplifiers

Difference between voltage and power amplifier, classification of power amplifiers-Class A, Class B, Class C and their comparisons.

Class A single ended power amplifier–working. Transformer coupled Class A power amplifier-working, overall efficiency (derivation). Circuit operation of complementary symmetry class B push pull power amplifier (no derivation), crossover distortion, heat sinks.

Tuned amplifiers - single tuned and double tuned amplifiers–circuit diagram, working and frequency response for each, limitations of single tuned amplifier, brief note on use of tuned amplifiers in communication circuits.

Unit 3: 9 hours

Differential amplifier

Circuit diagram, different configurations (mention only) – working, dc and ac analysis (r_e model) of dual input balanced output differential amplifier – tail current, expressions for Q point, differential gain, common mode gain, C.M.R.R, input impedance and output impedances.

Current Mirror – circuit diagram and working, differential amplifier with current mirror–circuit diagram and working (explanation of increase in C.M.R.R).

Unit 4: 12 hours

Feedback and Oscillators

Feedback–concept of feedback, types of feedback–positive & negative feedback, advantages and disadvantages for each, negative feedback configurations– voltage series, voltage shunt, current series and current shunt (block diagram representation for each). Voltage Series negative feedback–effect of negative feedback on voltage gain-derivation, effect of negative feedback (no derivations) on Z_i, Z_o, BW, noise & distortion and stability. Numerical problems.

Sinusoidal Oscillators–damped and undamped oscillations, basic principle of oscillator, positive feedback, barkhausen criterion, classification of oscillators–LC, RC and crystal oscillators. Collpitt & Hartley oscillators using transistors – circuit diagrams, working (no

derivations) and numerical problems. Equivalent circuit of a piezo electric crystal, working of Colpitt crystal oscillator. Types of RC oscillators (mention only).
Multivibrator–types, block diagrams of astable, monostable & bistable multivibrators with waveforms. Circuit diagram and working of astable Multivibrator using transistors (no derivation).

Unit 5: **14 hours**

Special purpose devices

MOSFET–types, circuit symbols of depletion type MOSFET (both N channel and P Channel). Circuit symbols of enhancement type MOSFET(both N channel and P channel).
N channel enhancement type MOSFET–working, characteristic curves (without experimental circuit).
UJT– Basic construction, equivalent circuit, intrinsic standoff ratio, working, characteristics and relaxation oscillator-expression. Numerical problems.
SCR– working, V-I characteristics, full wave controlled rectifier-derivations for average values of load current and voltage, numerical problems.
Triac and Diac – circuit symbol, basic constructional features, operation and applications (mention only).
LED– circuit symbol, operation and applications (mention only) and 7 segment display-common cathode and common anode (mention only), pin/segment identification- display of decimal digits.
LCD – types, applications (mention only), advantages over LED.
Tunnel diode, varactor diode, photo diode, photo Transistor & solar cell – circuit symbol, characteristics, applications (mention only).

Text books:

1. A Text book of Electronics, R.S.Sedha, S Chand and Co., Multicolour,3rd edition , 2012.
2. Electronic Principles , Albert Malvino& David J Bates, TMH, 7th edition-2010
3. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI

Reference books:

1. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.
2. Electronics text lab manual, Paul B. Zbar.
3. Basic Electronics and Linear circuits, N.N. Bhargava, D.C. Kulshresta and D.C
4. Gupta-TMH.
5. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
6. Principles of Electronics By V.K. Mehta, S.Chand& Co.
7. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.

Semester II - Practical II

EL-201P ELECTRONIC CIRCUITS AND SPECIAL PURPOSE DEVICES LAB

PART A –Demonstration experiment - not for Evaluation

1. Measurement of voltage, time period and frequency using C.R.O.

PART B –Performance experiments

1. CE Amplifier – frequency response
2. CC amplifier – voltage gain at one frequency, input and output impedances.
3. Tuned amplifier – frequency response
4. FET characteristics.
5. MOSFET characteristics
6. Common source FET amplifier
7. Hartley / Colpitt's oscillator
8. UJT characteristics
9. UJT relaxation oscillator.
10. SCR characteristics.
11. Transistor series regulator.
12. Current mirror.
13. Differential amplifier – common mode & differential gain, C.M.R.R.
14. Clipping and clamping circuits-unbiased shunt type positive & negative Clippers, unbiased positive & negative Clampers.

Note: Minimum of 8 experiments to be performed.

B.Sc. Electronics Syllabus

Semester III – Paper 3

EL-301T LINEAR INTEGRATED CIRCUITS AND 'C' PROGRAMMING

Unit 1: **14 hours**

Integrated circuit and operational amplifier

Integrated circuit, Advantages and disadvantages of ICs, scale of integration– classification of ICs by structure and by function (mention only), IC terminology, fabrication of monolithic IC – steps involved in the fabrication of a NPN transistor (epitaxial planar diffusion process).

Operational amplifiers- block diagram, equivalent circuit, various parameters op-amp -input bias current, input offset voltage, output offset voltage, CMRR, slew rate, SVRR, Characteristics of ideal and practical op-amps. Mention 3 different op-amp ICs (Mono, dual and quad op-amp ICs(mention only). 741, OP 07, LM 308, etc. and their comparison with respect to parameters, limitations of op-amp in open loop mode.

Op - Amp with negative feedback**:** Inverting amplifier- derivations for A_V, concept of virtual short and virtual ground. Non- inverting amplifier – derivations for Av. Voltage follower-circuit and features, Summing amplifier/adder and subtractor – derivation for the output voltage. Averaging amplifier, scale changer, numerical problems.

Integrator, differentiator- derivation for the output voltage, output waveforms for sine and square wave inputs, small signal half wave rectifier-circuit and working.

Unit 2: **14 hours**

Applications of operational amplifier & IC 555

Open loop applications: comparator-circuit and characteristics, schmitt trigger-circuit and waveforms, schmitt trigger ICs (mention only)

First order active filters- low pass, high pass, band pass, band reject and all pass filters.

Circuit diagrams, derivation for cutoff frequency and numerical problems for low pass and high pass filters only. Instrumentation amplifier – circuit and working.

Phase-shift & Wein bridge oscillator using op-amp**:** circuit, working, expression for frequency of oscillation (no derivation), numerical problems.

Fixed and variable IC regulators– IC 78xx and IC 79xx -concepts only, IC LM317- output voltage equation (mention only) and simple numerical problems.

555 timer: functional block diagram, Multivibrator–types (mention only), Circuit diagram and Astable Multivibrator – circuit with 555 timer and working, equation for frequency of oscillations (no derivation),numerical problems. Circuit of monostable multivibrator using 555.

Unit 3 **12 hours**

C Programming

Introduction, Importance of C, Character set, Tokens, keywords, identifier, constants, basic data types, variables: declaration & assigning values. Structure of C program

Arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, expressions and evaluation of expressions, type cast operator, implicit conversions, precedence of operators. Arrays-concepts, declaration, accessing elements, storing elements, two-dimensional and multi-dimensional arrays. Input output statement–sprintf(), scanf() & getch()) and library functions (math and string related functions).

Unit 4 **08 hours**

Decision making, branching & looping

Decision making, branching and looping : if, if-else, else-if, switch statement, break, for loop, while loop and do loop. Functions: Defining functions, function arguments and passing, returning values from functions, example programs.

Unit 5 **08 hours**

Structures and unions

defining and declaring a structure variables, accessing structure members, initializing a structure, copying and comparing structure variables, array of structures, arrays within structures, structures within structures, structures and functions. Unions-size of structures, bit fields, example programs.

Text books:

1. A Text book of Electronics, R.S.Sedha, S Chand and Co., Multicolour,3rd edition , 2012.
2. Operational Amplifier and Linear Integrated circuits - Ramakanth Gayekwad PHI 5th edition.
3. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky, 9th Edition, 2013, PHI**.**
4. Programming in ANSI C, Balagurusamy, 2nd edition, TMH.

Reference books:

1. Liner Integrated circuits by Roy Choudhury, New age international, 4th edition,2010
2. Basic electronics- B.L. Theraja - S. Chand and Co. 3rd edition -2012.
3. Electronics text lab manual, Paul B. Zbar.
4. Electronic devices, David A Bell, Reston Publishing Company/DB Tarapurwala Publ.
5. Electronic devices, applications and Integrated circuits, Mathur, Kulshreshta and Chadha, Umesh Publications.
6. Computer concepts and C Programming techniques by Padma Reddy, Nandi publications, 4th edition, 2010.

Semester III - Practical III

EL-301P LINEAR INTEGRATED CIRCUITS AND 'C' PROGRAMMING LAB

PART- A

Experiments on Linear Integrated circuits

1. Inverting and non inverting amplifiers.
2. Adder and subtractor.
3. Study of first order low-pass filter and high-pass filter.
4. RC phase shift oscillator/ Wein bridge oscillator Using op-amp.
5. Small signal half wave rectifier using OP-AMP.
6. Astable multivibrator / Monostable multivibrator using IC555.
7. Fixed voltage IC regulators using 78 series and 79 series.
8. Variable voltage regulator using IC LM 317.
9. Op-amp as Integrator /differentiator

Note: Minimum of 5 experiments to be performed in PART- A

PART- B

Experiments on 'C' Programming.

1. To generate the Fibonacci series up to the given limit N and also print the number of elements in the series.
2. To find minimum and maximum of N numbers.
3. Find the GCD of two integer numbers.
4. Write a program to calculate factorial of a given number.
5. Find all the roots of a quadratic equation Ax2 + Bx + C = 0 for non – zero coefficients A, B and C. Else report error.
6. Calculate the value of sin (x) and cos (x) using the series. Also print sin (x) and cos (x) value using library function.
7. To generate and print prime numbers up to an integer N.
8. To sort given N numbers in ascending order.
9. To find the sum & difference of two matrices of order MxN and PxQ.
10. To find the product of two matrices of order MxN and PxQ.
11. To find the transpose of given MxN matrix.
12. To find the sum of principle and secondary diagonal elements of the given M ×N matrix.
13. Write a program to calculate the subject wise and student wise totals and store them as a part of the structure.

Note: Minimum of 5 experiments to be performed in PART- B

B.Sc. Electronics Syllabus

Semester IV – Paper 4

EL-401T DIGITAL ELECTRONICS AND VERILOG

Unit 1 **12 hours**

Boolean algebra and Logic gates

Boolean algebra- Positive and negative logic. Boolean laws. De Morgan's theorems, simplification of Boolean expressions-SOP and POS. Logic gates- basic logic gates-AND, OR, NOT, logic symbol and truth table. Derived logic gates (NAND,NOR, XOR & XNOR). Universal property of NOR and NAND gates. K-map-3 and 4 variable expressions. Pulse characteristics, logic Families-classification of digital ICs. Characteristics of logic families, circuit description of TTL NAND gate with totem pole and open collector.

TTL IC terminology. Circuit description of CMOS inverter, comparision of TTL and CMOS families.

Unit 2 **12 hours**

Combinational logic circuits

Combinational logic circuits-half adder, full adder, half subtractor, full subtractor. Two bit comparator. Encoder, decimal to BCD priority encoder. 2:4 decoder using AND gates, 3:8 decoder using NAND gates, BCD to decimal decoder, BCD to 7 segment decoder, 4:1 multiplexer, 1:4 demultiplexer using gates. D-A conversion– 4 bit binary weighted resistor type, circuit and working. Circuit of R-2R ladder–concept only.

A-D conversion–characteristics, successive approximation ADC. (mention the relevant ICs for all).

Unit 3 **14 hours**

Sequential logic circuits

RS latch, NAND and NOR latches, Flipflops, clocked RS F/F, edge triggering and level triggering, D F/F and edge triggered J-K F/F, T F/F, edge triggered M/S JK flip flop, clear & preset inputs. Registers and counters- 4bit serial in serial out, serial in Parallel out, parallel in serial out, parallel in parallel out, applications. Ring counter, Johnson counter applications. Asynchronous counters-Logic diagram, Truth table and timing diagrams of 3 bit ripple counter, 3 bit Up-Down counter and modified counters. Synchronous counter- design using K-maps (for mod 3 & mod 5 counters only).

Programmable Logic devices – basic concepts.

Types of PLDs (mention only) - SPLDs–ROM, PLA, PAL and GAL.

CPLD and FPGA.

UNIT 4: **09 hours**

Introduction to Verilog

A Brief History of HDL, Structure of HDL Module, Comparison of VHDL and Verilog Introduction to Simulation and Synthesis Tools, Test Benches.

Verilog: Module, Delays, brief description - data flow style, behavioral style, structural style, mixed design style, simulating design.

Language Elements- Introduction, Keywords, Identifiers, White Space Characters, Comments, format, Integers, reals and strings. Logic Values, Data Types-net types, undeclared nets, scalars and vector nets, Register type, Parameters.

Expressions: Operands, Operators, types of Expressions
Gate level modeling - Introduction, built in Primitive Gates, multiple input gates, Tri-state gates, pull gates, MOS switches, bidirectional switches, gate delay, array instances, implicit nets, Illustrative Examples (both combinational and sequential logic circuits).

UNIT 5: **09 hours**

Data flow Modeling and Behavioral Modeling

Data flow Modeling: Continuous assignment, net declaration assignments, delays, net delays and examples.
Behavioral Modeling: Procedural constructs, timing controls, block statement, procedural assignments, conditional statement, loop statement, procedural continuous assignment, Illustrative Examples

Text books:

1. Digital Fundamentals : Floyd , CBS Publishers
2. Modern Digital Electronics: R.P. Jain, 3rd edition, TMH Publications.
3. A Verilog HDL Primer – J. Bhasker, BSP, 2003 II Edition.
4. Verilog HDL-A guide to digital design and synthesis-SAMIR PALNITKAR, Pearson, 2nd edition.
5. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, 2004 IEEE Press.

Reference books:

1. Digital Principles and applications: Malvino and Leach-TMH 3rd edition
   Digital Systems : Ronald J Tocci, PHI.
2. Design with TTL ICs, Robert L Morries, TMH.
3. Verilog and VHDL by BOTROS.
4. Digital Logic and Compuer design: M. Morris Mano- PHI, new edition
5. Digital Design: M. Morris Mano- PHI 2nd edition, 2000.
6. Digital computer Electronics: Malvino-TMH
7. Digital computer Fundamentals: Thomas C. Bartee-TMH
8. Experiments in digital principles: Malvino and Leach-TMH

Semester IV - Practical IV

EL-401P DIGITAL ELECTRONICS AND VERILOG LAB

Part-A

Experiments in Digital Electronics

1. Characteristics of logic gates 7400, 7402, 7404, 7406,7432
2. Study of logic gates using ICs (7404,7408, 7432,7402,7400,7486,7410) and study of universal property of NAND and NOR gates.
3. Half adder and Full adder using gates.
4. Half subtractor and full subtractor using gates.
5. Clocked RS and D FF using IC 7400 and JK FF using IC 7476.
6. D-A converter-Binary weighted resistor.
7. Shift registers-SISO and SIPO.
8. 4 bit ripple counter using IC 7476 and conversion to decade counter.
9. Decimal to BCD encoder, BCD to 7 segment decoder-7447.
10. Comparator-Study of 4 bit magnitude comparator.
11. Decoder (2:4) using AND gates & (3:8) using 74138
12. Realisation of Full adder and Full subtractor using Mux and Decoder.
13. Study of Multiplexer using IC 74150 and De-Multiplexer using IC 74154.
14. Design and Realization of 4 bit Adder/Subtractor using IC 7483.
15. Design and Realization of BCD Adder using IC 7483.

Note: Minimum of 5 experiments to be performed in part A

Part-B

Experiments in Verilog

1. Write code to realize basic and derived logic gates.
2. Half adder, Full Adder using basic and derived gates.
3. Half subtractor and Full Subtractor using basic and derived gates.
4. Clocked D FF, T FF and JK FF (with Reset inputs).
5. Multiplexer (4x1, 8x1) and Demultiplexer using logic gates.
6. Decoder (2x4, 3x8), Encoders and Priority Encoders.
7. Design and simulation of a 4 bit Adder.
8. Code converters (Binary to Gray and vice versa).
9. 2 bit Magnitude comparator.
10. 3 bit Ripple counter.

Note: Minimum of 5 experiments to be performed in part B

B.Sc. Electronics Syllabus

Semester V – Paper 5

EL-501T COMMUNICATION-I

UNIT 1 **07 hours**

Noise and Transmission lines

Noise-Introduction, internal and external noises, signal to noise ratio and noise figure-numerical examples.

Transmission lines - types and equivalent circuit of T-lines, primary and secondary constants. reflection co-efficient, VSWR and CSWR-numerical examples, losses and distortions in T-lines. propagation of waves-ground wave, sky-wave and space wave propagations, ionosphere and its effects.

UNIT 2 **10 hours**

Analog Modulation techniques

Block diagram of electronic communication system. modulation-need and types of modulation-AM, FM & PM. Amplitude modulation – representation, modulation index, expression for instantaneous voltage, power relations, frequency spectrum, DSBFC, DSBSC and SSBSC (mention only), AM collector modulator. Limitations of AM. FM - definition, modulation index, FM frequency spectrum diagram, bandwidth requirements, frequency deviation and carrier swing, FM generator-varactor diode modulator. Block diagram of AM transmitter and FM transmitter with AFC, qualitative study of pre-emphasis. Comparison of AM and FM, numerical examples.

UNIT 3 **09 hours**

Radio Receivers

Demodulation- AM detection – principles of detection, linear diode and Transistor detector-circuits, principle of working and waveforms. FM detector – principle, slope detector-circuit, working. AM superheterodyne receiver– principle, block diagram, function of each stage with waveform, qualitative study of AGC. FM superheterodyne receiver– principle, block diagram, function of each stage with waveform, qualitative study of de-emphasis. Characteristics of radio receivers-qualitative study of sensitivity, selectivity, signal to noise ratio, fidelity, stability, image frequency and its rejection.

Unit 4: **08 hours**

Antennas

Radiation mechanism, wire Radiators in space-resonant antennas-radiation pattern and current distribution for different lengths, non - resonant antenna, antenna parameters-gain, directive gain, power gain, bandwidth, beam width, polarisation, efficiency, radiation resistance, total effective resistance, derivation for the power radiated by antenna and expression for radiation resistance. Ungrounded and grounded antennas, effect of antenna height. Folded dipole, numerical examples wherever applicable. Qualitative study of helical antenna and loop antenna.

Unit 5 **08 hours**

Television

Introduction, scanning, interlaced scanning, T.V. camera tube (vidicon), composite video signal – blanking and synchronizing pulses, vestigial side band transmission, TV systems and standards – comparison between American and European systems. Block diagrams of monochrome TV transmitter and receiver. basic principles of colour TV, primary and

secondary colours, colour combinations, chromo and luminance processing as per PAL system. Colour TV receiver (PAL). Concept of CCTV, HDTV, Picture in Picture, Picture phones, TV games, numerical examples wherever applicable.

Text Books:

1. Electronic Communication, George Kennedy, 3rd edition, TMH.
2. Electronic Communication, Roddy and Coolen, 4th edition, PHI.

Reference Books:

3. Electronics Communications Systems, Wayne Thomasi, 5th edition, Pearson Ed.
4. Digital Communication System : Ronald J. Tocci

Semester V - Practical V
EL-501P COMMUNICATION LAB

1. Amplitude modulator and Amplitude demodulator
2. FM modulator using IC8038
3. Pre –emphasis and De- emphasis
4. Three way Audio cross over network.
5. IF amplifier
6. Class C tuned amplifier
7. AGC
8. VCO using IC 566
9. Frequency mixer
10. Time Division Multiplexing and de multiplexing
11. Frequency Multiplier
12. Study of Sensitivity, Selectivity and Fidelity of an AM radio receiver

Note: Minimum of 8 experiments to be performed.

B.Sc. Electronics Syllabus

Semester V – Paper 6

EL-502T MICROPROSSESOR and ELECTRONIC INSTRUMENTATION

UNIT 1: **09 hours**

Introduction to Microprocessor

Introduction, applications, basic block diagram, speed, word size, memory capacity, classification of microprocessors (mention different microprocessors being used)

Microprocessor 8085: Features, architecture –block diagram, internal registers, register pairs, flags, stack pointer, program counter, types of buses. Multiplexed address and data bus, generation of control signals, pin description of microprocessor 8085.

8085 Instructions-Operation code, Operand & Mnemonics.

Instruction set of 8085, instruction classification, addressing modes, instruction format.

Data transfer instructions, arithmetic instructions, increment & decrement instructions, logical instructions, branch instructions and machine control instructions.

UNIT 2: **09 hours**

Stack operations and Microprocessor Programming

Stack operations, subroutine calls and return operations. Delay loops, use of counters, timing diagrams-instruction cycle, machine cycle, T- states, time delay-numerical examples.

Programs for data transfer and memory operations (direct & indirect addressing), addition and subtraction of two 8-bit & 16- bit numbers, multiplication, display of smallest / largest number in a given array of numbers, sorting of numbers in descending / ascending order. Number of 1's and 0's in a given byte, testing for zero condition. 1's and 2's complements. Verification of truth tables of logic gates, program to add two N byte numbers, program to generate Fibonacci series up to the limit, program to find the factorial of a number, program to find the GCD of two integer numbers.

UNIT 3: **08 hours**

I/O instructions and Interfacing

I/O instructions and, interrupts in 8085. Basic interfacing concepts, compatible ICs of μP 8085, data transfer, synchronous I/O data transfer using interrupts.

Memory interfacing – address decoding, interfacing RAM and ROM.

Interfacings I/O devices– input port, output port, IN & OUT instructions, interfacing input devices (interfacing matrix key board-block diagram), interfacing output devices (LED display interfacing-block diagram).

PPI IC 8255– features, pin diagram, functional block diagram, ports & their modes.

UNIT 4: **08 hours**

Measurement systems, Transducers & Electronic Instrumentation

Introduction to general measurement system – characteristics - definition –static & dynamic. Transducers, types – resistive, capacitive and inductive transducers, strain gauge, LVDT (variable inductive transducers) temperature transducers- thermo couple, thermistors – ultrasonic temperature transducer, photoelectric transducers, pressure transducers-MIC and and loud speaker, signal conditioning (concept only), amplifier – chopper amplifier –carrier amplifier - lock in amplifier.

UNIT 5: **08 hours**

Introduction to Bio-medical instruments

Origin of bio-electric signals, resting & action potential – propagation, physiological transducers – active & passive transducer for medical application – diagnostic & analytical equipments -electrodes for ECG, EEG, and EMG, block diagram of ECG and EEG systems.

Text Books:

1. Microprocessor Architecture, Programming and Applications with 8085, Ramesh S.Gaonkar - Wiley Eastern Limited- IV Edition.
2. Fundamentals of Microprocessor & Microcomputer: B. Ram—Danpat Rai Publications.
3. Instrumentation devices and systems: Rangan, Sarma, Mani, TMH
4. Handbook of biomedical instrumentation: Khandpur R S, TMH
5. Electronic Instrumentation- H. S. Kalsi, TMH, 2004

Reference Books:

1. Microprocessor and Interfacing- Programming & Hardware, Douglas Hall, TMH, 2nd edition,1991
2. Modern Digital Electronics, R.P. Jain–TMH–2nd Edition.
3. Microprocessor and its Applications- R.Theagarajan, S. Dhanasekaran and S. Dhanapal–New Age International Publishers.
4. Microprocessors and Microcontrollers-B.P singh, Galgotia publications.
5. The Intel Microprocessors 8086/8088,80186,386,486, architecture, Programming and interfacing – Barry. B. Bray, PHI, New Delhi.
6. Microprocessor Lab Manual- G.T Swamy- Lakshmi Publications 2006.
7. Instrumentation Measurement and analysis: Nakra B C, Chaudry K K, TMH
8. Measurement systems applications and design: Doeblin E O, McGraw Hill, 1990.
9. Electron measurements and instrumentation techniques: Cooper W D and Helfric A D, PHI, 1989.
10. Biomedical instrumentation and measurements: Leslie-Cromwell, Fred J Weibell, Erich A Pfeiffer, PHI, 1994.
11. Instrumentation, Measurement& Feedback by Barry Jones, PHI
12. Electronic Instrumentation and Measurements, David A Bell, PHI / Pearson Education, 2006.
13. Electronics & electrical measurements, A K Sawhney, Dhanpat Rai & sons, 9th edition.
14. Biomedical Instrumentation - M.Arumugham, Anuraçlha Agencies
15. Bio Medical Instrumentation Engineering – Leslee and Chronewell.

Semester V - Practical VI

EL-502P 8085 Microprocessor programs and Interfacing

1. Program to add (with carry) 8 bit numbers - Binary and BCD
2. Program to subtract two 8 bit numbers - Binary and BCD
3. Program to add & subtract two 16-bit numbers (with carry.
4. Program to multiply two 8-bit numbers.
5. Program to find GCD of two numbers.
6. Program to find the ratio (division) of two 8-bit numbers.
7. Program to find the number of 1's & 0's in a given byte and program to display the smallest number in a given array of numbers.
8. Program to sort the given array of numbers (descending order) and to find the smallest number.
9. Program to display decimal up counting (00-99).
10. Program to verify the truth table of logic gates.
11. Interfacing 20 keys matrix keyboard
12. Interfacing seven-segment display
13. Interfacing DAC card to convert digital input to equivalent analog output (preferably using IC DAC 08 and IC 741)
14. Interfacing a stepper motor.

(Any EIGHT Experiments – any two interfacing experiments compulsory)

B.Sc. Electronics Syllabus

Semester VI – Paper 7

EL-601T COMMUNICATION-II

UNIT 1: **08 hours**

Digital communication

Introduction to pulse and digital communications, digital radio, sampling theorem, types- PAM, PWM, PPM, PCM – quantization, advantages and applications, digital modulations (FSK, PSK, and ASK). Advantage and disadvantages of digital transmission, characteristics of data transmission circuits – Shannon limit for information capacity, bandwidth requirements, data transmission speed, noise, cross talk, echo suppressors, distortion and equalizer, MODEM– modes, classification, interfacing (RS232).

UNIT 2 **09 hours**

RADAR Systems

RADAR– principles, frequencies and powers used in RADAR, maximum Unambiguous range, detailed block diagram of pulsed RADAR system, RADAR range equation-derivation, factors influencing maximum range, effect of ground on RADAR antenna characteristics, Doppler effect, MTI RADAR-block diagram, CW RADAR-block diagram, advantages, applications and limitations, FM CW RADAR-block diagram, numerical examples wherever applicable.

UNIT 3 **08 hours**

Satellite communication

Introduction, need, satellite orbits, advantages and disadvantages of geostationary satellites. Satellite visibility, satellite system – space segment, block diagrams of satellite sub systems, up link, down link, cross link, transponders (C- Band), effect of solar eclipse, path loss, ground station, simplified block diagram of earth station. Satellite access – TDMA, FDMA, CDMA concepts, comparison of TDMA and FDMA, Satellite antenna (parabolic dish antenna), GPS-services like SPS & PPS.

UNIT 4 **09 hours**

Optical Fiber Communication

Introduction – need for OFC. Block diagram of OFC system. Fiber optic cables, light propagation through fiber – step index fiber, graded index fiber, Snell's law, numerical aperture (derivation). Types of optical fiber cables, light sources – requirements, LEDs and semiconductor laser diodes. Photo detectors – PN, PIN and avalanche photodiodes. Losses in optical fibers – Rayleigh scattering, absorption, leaky modes, bending, joint junction losses. Advantages and disadvantages of OFC over metallic cables.

Unit 5 **08 hours**

Cellular Communication and Wireless LANs

Concept of cellular mobile communication – cell and cell splitting, frequency bands used in cellular communication, absolute RF channel numbers (ARFCN), frequency reuse, roaming and hand off, authentication of the SIM card of the subscribers, IMEI number, concept of data encryption, architecture (block diagram) of cellular mobile communication network, CDMA technology, CDMA overview, simplified block diagram of cellular phone handset, Comparative study of GSM and CDMA, 2G, 3G and 4G concepts.

Major components of local area network- Primary characteristics of ethernet-mobile IP, OSI model, wireless LAN requirements-concept of Bluetooth, WiFi and WiMAX.

Text Books:

1. Electronic Communication systems, Kennedy & Davis, IVth edition-TATA McGraw Hill.
2. Introduction to RADAR systems – Skolnik- McGraw Hill.
3. Advanced Electronic Communication systems, Wayne Tomasi- 6th edition, Low priced edition- Pearson education

Reference Books:

1. Electronic Communication systems, Fundamentals through Advanced, Wayne Tomasi - 5th edition.

Semester VI - Practical VII

EL-601P COMMUNICATION and MICROCONTROLLER LAB

PART- A

Communication Experiments.

1. ASK modulator and demodulator
2. FSK modulation
3. PWM and PPM
4. PAM modulator and demodulator
5. Band Elimination Filter
6. Two stage RC coupled Amplifier-Determination of mid - band gain of individual stages, overall gain and the concept of loading effect.
7. Study of switched mode regulator using PWM
8. Characteristics of OFC

Note: Minimum of 5 experiments to be performed from PART- A.

PART- B

Experiments on Microcontroller Programming

01. Program to add (with carry) and subtract two 8-bit numbers.
02. Program to find 2's complement of a 16-bit number.
03. Program to find the sum of N 8-bit numbers.
04. Program to find largest of N numbers.
05. Program to find smallest of N numbers
06. Program to find whether the given data is palindrome.
07. Program to arrange the numbers in ascending order.
08. Program to arrange the numbers in descending order .
09. Program to interchange Two one – byte numbers.
10. Program to interchange N one – byte numbers.

Note: Minimum of 5 experiments to be performed from PART- B.

B.Sc. Electronics Syllabus
Semester VI – Paper 8
EL-602T MICROCONTROLLERS

UNIT 1: **10 hours**

Introduction to Microcontrollers

Basic block diagram, comparison of microcontroller with microprocessors, comparison of 8 bit, 16 bit and 32 bit microcontrollers.

Overview of 8051 series–comparison of 8051, 8052, 8031.

Other Microcontroller families (Mention only) – Maxim 89C420, 89C440, 89C450 Atmel Corporation AT89C51, AT 89LV51, AT89C1051, AT89C2051, AT89C52.

MICROCONTROLLER 8051- architecture -internal block diagram, key features of 8051, pin diagram, memory organization, Internal RAM memory, Internal ROM. General purpose data memory, special purpose/function registers, external memory.

Counters and timers – 8051 oscillator and clock, program counter, TCON, TMOD, timer counter interrupts, timer modes of operation. Input / output ports and circuits/ configurations, serial data input / output – SCON, PCON, serial data transmission modes.

UNIT 2: **10 hours**

8051- Interrupts, Addressing modes and Instruction set

Interrupts – IE, IP, time flag interrupts, serial port interrupt, external interrupts, reset, interrupt control, interrupt priority, interrupt destinations & software generated interrupts.

Addressing modes–immediate addressing, register addressing, direct and indirect addressing,

Data transfer instructions – internal data move, external data move, code memory read-only data move, Push and Pop and data exchange instructions.

Logical Instructions – byte level logical operations, bit level logical operations, rotate and swap operations.

Arithmetic Instructions – flags, incrementing and decrementing, addition, subtraction, multiplication and division, decimal arithmetic, simple programs in assembly language.

UNIT 3: **09 hours**

8051 programming in C

Jump and call instructions – jump and call program range, jumps, calls and subroutines, interrupts and returns, simple example programs in assembly language.

8051 programming using C– Data types and time delays in 8051C, I/O programming, logic operations, data conversion programs, accessing code ROM space and data serialization.

Timer / Counter Programming in 8051–Programming 8051 timers, counter programming, programming timers 0 and 1 in 8051 C , example programs.

UNIT 4: **09 hours**

Interfacing with 8051

Basic interfacing concepts and interrupts, Programming–8051 interrupts, programming Timer interrupts, programming the external hardware interrupts.

Schematic diagrams and basic concepts of Interfacing of 8051 to keyboard, seven segment display, stepper motor, DAC, ADC and traffic light controller circuits.

UNIT 5: **04 hours**

PIC microcontrollers

Core features of PIC microcontrollers, overview of various PIC microcontroller series. PIC 16F877A-features, pin diagram, I/O ports, interfacing with LCD.

Semester VI - Practical VIII

EL-602P PROJECT WORK

- Students in a group, not exceeding **THREE**, should design, fabricate and assemble ONE Electronic project in their respective colleges. The department faculty is required to guide the project work.
- Each student should prepare a report and submit the report at the time of the practical examination duly certified by the concerned faculty guide & HOD.
- Department faculty shall ensure that the entire project work is carried out in their respective colleges by utilising the practical classes assigned to practical VIII. A seminar on the project work is compulsory.

* * *

BANGALORE UNIVERSITY

REGULATIONS, SCHEME AND SYLLABUS

For the course

I to VI Semesters

BACHELOR OF SCIENCE IN COMPUTER SCIENCE (BSc(CS))

(Choice Based Credit System (Semester Scheme) –Y2K14 Scheme)

Revised w.e.f.

Academic Year 2014-2015 and onwards

Regulations, Scheme of study and Examination for B Sc Degree Course
Under Choice Based Credit System - Semester System (Y2K14 SCHEME)
(Revised w.e.f. 2014 -2015)

R1.

a) Title of the course: **B. Sc in Computer Science**

b) Duration of the Course: Durations of the undergraduate programmes shall extend over FOUR semesters (TWO academic years) for the Associate Degree(Advance Diploma), SIX semesters (Three academic years) for the regular Bachelor Degree.

c) Scheme of study:

i) There shall be one theory paper and one practical from first semester to fourth semester. The practical paper corresponds to theory papers.

ii) There shall be two theory papers and two practical during fifth and sixth semesters.

iii) Medium of Instruction: The medium of instruction shall be English.

d) Scheme of Examination: At the end of each semester there shall be University examination of three hours duration in each of the theory and practical papers.

The question paper pattern for theory paper has two sections. (70 Marks)

Section –A contains 12 questions, students has to attend 10 questions. Each carries 2 Marks (10 * 2 = 20)

Section – B contains 8 questions (question may contain sub questions), students has to attend 5 questions. each carries 10 Marks (5 * 10 = 50)

R2. Each semester shall be of 90 working days from the date of commencement of the each Semester.

R3. Attendance: As per Bangalore University regulations in force for science degree courses.

R4. POWER TO REMOVE DIFFICULTIES

If any difficulty arises in giving effect to the provisions of these regulations, the Vice – Chancellor may by order make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, as appears to be necessary or expedient to remove the difficulty. Every order made under this rule shall be subject to ratification by the appropriate University Authorities.

Title of Papers, Scheme of Study and Examination for B Sc in Computer Science, Revised w.e.f. 2014–2015.

Sem	Paper	Title of the paper	Hours/ Week	Marks			Credits
				IA	Exam	Total	
I	CS1T	Programming Concepts using C	4	30	70	150	3
	CS1P	C Programming Lab	3	15	35		
II	CS2T	Data Structures	4	30	70	150	3
	CS2P	Data Structures Lab	3	15	35		
III	CS3T	Database Management System and Software Engineering	4	30	70	150	3
	CS3P	DBMS Lab	3	15	35		
IV	CS4T	Operating System and UNIX	4	30	70	150	3
	CS4P	UNIX Programming Lab	3	15	35		
V	CS5T1	Object Oriented Programming using JAVA	3	30	70	150	3
	CS5P1	Java Programming Lab	3	15	35		
	CS5T2	Visual Programming	3	30	70	150	3
	CS5P2	Visual Programming Lab	3	15	35		
VI	CS6T1	Web Programming	3	30	70	150	6
	CS6P1	Web Programming Lab	3	15	35		
	CS6T2	Computer Networks	3	30	70	150	
	CS6P2	Project Lab	3	15	35		

I Sem B Sc

CS1T: PROGRAMMING CONCEPTS USING C

Total Teaching Hours : 60 No of Hours / Week : 04

Unit-I

Introduction to Programming Concepts: Software, Classification of Software, Modular Programming, Structured Programming, Algorithms and Flowcharts with examples. Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions.

[12 Hours]

Unit-II

Managing Input and Output Operation: Formatted and Unformatted I/O Functions
Decision making, branching and looping: Decision Making Statements - if Statement, if–else statement, nesting of if-else statements, else–if ladder, switch statement, ?: operator, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements. Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.

[12 Hours]

Unit-III

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables.

[12 Hours]

Unit-IV

Structures - Declaring and Initializing, Nested structure, Array of Structure, Passing structures to functions, Unions, typedef, enum, Bit fields. Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions.

[12 Hours]

Unit-V

Files - File modes, File functions, and File operations, Text and Binary files, Command Line arguments. C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.

[12 Hours]

TEXT BOOKS

1. E. Balaguruswamy, “Programming In ANSI C”, 4th edition, TMH Publications, 2007
2. Ashok N. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education, 2006

REFERENCES BOOKS

1. Ashok N. Kamthane et. al., “Computer Programming and IT”, Pearson Education, 2011
2. Mahapatra, “ Thinking In C ”, PHI Publications, 1998.
3. Yashwant Kanetkar, “Let Us C”, 13th Edition, PHP, 2013.

CS1P: C PROGRAMMING LAB

PART – A

1) Write a C program to accept employee number, employee name, basic pay and calculate gross salary, deduction and find the net salary of an employee for the following details.

Dearness Allowance	40% of Basic Pay
House Rent Allowance	20% of Basic Pay
Provident Fund	12% of Basic Pay
Income Tax	4% of Basic Pay

2) Write a C Program to find the roots of the given quadratic equation using if-else if statement.
3) Write a menu driven C program to find ,

(i) Reverse of a number (ii) Factorial of N (Use Switch case)

4) Write a C program to find Sin(x). [$x - x^3/3! + x^5/5! - \ldots\ldots x^n/n!$]
5) Write a C program to arrange the given set of numbers in ascending and descending order.
6) Write a C program to find product of two N x M matrices.
7) Write a C program to calculate NCR= N!/ R! * (N-R)! Using function.
8) Write a C program to display Fibonacci series using recursive function.
9) Write a C program to compare two strings using pointers.
10) Write a C program to demonstrate the user defined header file.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note :

a) The candidate has to write both the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

II Sem B Sc

CS2T: DATA STRUCTURES

Total Teaching Hours : 60 No of Hours / Week : 04

Unit-I

Introduction and Overview: Definition, Elementary data organization, Data Structures, data structures operations, Abstract data types, algorithms complexity, time-space tradeoff. Preliminaries: Mathematical notations and functions, Algorithmic notations, control structures, Complexity of algorithms, asymptotic notations for complexity of algorithms. String Processing: Definition, Storing Stings, String as ADT, String

operations, word/text processing, Pattern Matching algorithms.

[12 Hours]

Unit-II

Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting, Sorting: Bubble sort, Insertion sort, Selection sort, Searching: Linear Search, Binary search, Multidimensional arrays, Matrices and Sparse matrices.

[12 Hours]

Unit-III

Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly liked list; Doubly liked list, Header liked list, Circular linked list.

[12 Hours]

Unit-IV

Stacks – Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi, Implementation of recursive procedures by stack. Queues – Definition, Array representation of queue, Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue , Priority queue, Operations on Queues, Applications of queues.

[12 Hours]

Unit-V

Graphs: Graph theory terminology, Sequential representation of Graphs: Adjacency matrix, traversing a Graph. Tree – Definitions, Binary trees, Representing binary trees in memory, Traversing binary trees

[12 Hours]

TEXT BOOKS

1. Seymour Lipschutz: Data Structures with C, Schaum's ouT*lines*, Tata McGraw-Hill, 2011.

REFERENCES BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2013.
2. Robert Kruse, C.L.Tondo, Bruce Leung, Shashi Mogalla, "Data Structures and Program Design using C", Pearson Education, 2009.
3. Forouzan, "A Structured Programming Approach using C", 2nd Edition, Cengage Learning India, 2008.

CS2P : DATA STRUCTURES USING C LAB

PART - A

1. Write a menu driven C program to perform the following string operations without using string functions: (i) String Length (ii) String Concatenation (ii) String Reverse
2. Write a C program to search for an element in an array using Binary search
3. Write a C program to sort a list of N elements using Bubble Sort Algorithm
4. Write a C program to demonstrate the working of stack using an array.
5. Write a C program for Towers of Hanoi problem.
6. Write a C program to find GCD of two numbers using recursion

7. Write a C program to convert and print a given valid fully parenthesized infix arithmetic expression to post fix expression, the expression consists of single character (letter or digit) as operands and +,-,*, / as operators, assume that only binary operators are allowed in the expression.
8. Write a C program to simulate the working of Circular Queue using an array.
9. Write a C program to construct a singly linked list and perform following operations
   a. LINSERT Inserting a node in the front of the list
   b. LDELETE Deleting the node based on value
   c. LSEARCH Searching a node based on value
   d. LDISPLAY Displaying all the nodes in the list
10. Write a C program to create and traverse a binary search tree.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note :

a) The candidate has to write two the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

III Sem B Sc

CS3T: DATABASE MANAGEMENT SYSTEM AND SOFTWARE ENGINEERING

Total Teaching Hours: 60 No of Hours / Week : 04

1. DATA BASE MANAGEMENT SYSTEM

Unit - I

Introduction: Data, Database, DBMS, Characteristics of Database Approach, Database Users, Advantages of DBMS. Database System Concepts and Architecture: Data Models, Schemas, and Instances, DBMS Architecture and Data Independence, Database languages and interfaces, The Database system Environment, Classification of Database Management Systems. Data Modeling Using the Entity-Relationship Model: High level Conceptual Data Models for Database Design with an example, Entity types, Entity sets, Attributes, and Keys, ER Model Concepts, Notation for ER Diagrams, Proper naming of Schema Constructs.

[12 hours]

Unit - II

RDBMS: Relational database concepts – attribute, tuple, types of attributes – single, multi-valued, stored, derived etc., keys – primary, index, candidate, alternate, foreign, Relationships, Relational algebra operations– UNION, INTERSECTION,

DIFFERENCE, CARTESIAN PRODUCT, SELECTION, PROJECTION, JOIN, DIVISION, relational calculus, Domain, Domain integrity, Integrity rules – Entity integrity, referential integrity, Normalization and its properties, I, II and III Normal forms.

[12 hours]

Unit - III

DDL and DML in SQL: DDL commands - create table/views/index, drop, alter, DML commands – select, insert, delete, update, etc., DCL commands – grant, revoke, commit, TCL commands, SQL – query, sub-query, nested query, Joins – natural, inner, outer join, aggregate functions in SQL. PL / SQL: Introduction, Exceptions & Cursor Management, Database Triggers, Functions,

[12 hours]

2. SOFTWARE ENGINEERING

Unit - IV

Software and Software Engineering: Defining Software, Software Application Domains, Software Engineering, Software Process, Software Engineering Practice, Software Myths. Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, Agile Development: Agility, Agility and the cost of change, Agile Process, Extreme Programming, Other Agile Process Models. Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing the use cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

[12 Hours]

Unit - V

Requirements Modeling: Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Flow-Oriented Modeling, Creating a Behavioral Model, Design Concepts: The Design Process, Design Concepts, The Design Model, Architectural Design, Component-Level Design, User Interface Design, Pattern-Based Design, Quality Concepts: Software Quality, Review Techniques, Software Quality Assurance Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, System Testing, The Art of Debugging, Software Testing Fundamentals, White box Testing, Block-Box Testing.

[12 hours]

Text Books

1. Remez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.
2. Roger S. Pressman – Software Engineering, A Practitioner's approach, 7th Edition, McGRAW-HILL Publication, 2010.

Reference Books

1. Pankaj Jalote, "An integrated approach to Software Engineering", 3rd Edition, Narosa Publishing House, 2013.
2. Abrahamsi. Silberschatz, Henry. F. Korth, S. Sudarshan, "Database System Concepts" 6th Edition, McGraw Hill, 2012.
3. C.J.Date, "Introduction to database systems", Eight Edition, Addison Wesley, 2003.
4. Ian Sommerville – Software Engineering, 9th Edition, Pearson Education Ltd, 2010.

CS3P : DATA BASE MANAGEMENT SYSTEM LAB
PART - A

1. The STUDENT detail databases has a table with the following attributes. The primary keys are underlined. STUDENT(regno: int, name: string, dob: date, marks: int)

i) Create the above table.

ii) Remove the existing attributes from the table.

iii) Change the date type of regno from integer to string.

iv) Add a new attribute phoneno to the existing table.

v) Enter five tuples into the table.

vi) Display all the tuples in student table.

2. A LIBRARY database has a table with the following attributes.

LIBRARY(bookid:int, title:string, author:string, publication:string, yearpub:int, price:real)

i) Create the above table.

ii) Enter the five tuples into the table

iii) Display all the tuples in student table.

iv) Display the different publishers from the list.

v) Arrange the tuples in the alphabetical order of the book titles.

vi) List the details of all the books whose price ranges between Rs. 100 and Rs. 300

3. The SALARY database of an organization has a table with the following attributes.

EMPSALARY(empcod:int, empnamee:string, dob:date, department:string, salary:real)

i) Create the above table.

ii) Enter the five tuples into the table

iii) Display all the number of employees working in each dapartment.

iv) Find the sum of the salaries of all employees.

v) Find the sum and average of the salaries of employees of a particular department.

vi) Find the least and highest salaries that an employee draws.

4. Consider the insurance database given below. The primary keys are underlined and the data types are specified.

PERSON(driver-id-no: string, name: string, address:strong)

CAR(regno: string, model: string, year: int)

ACCIDENT(report-no: int, date: date, location: String)

OWNS(driver-id-no: string, regno: string)

PARTICIPATED(driver-id-no: string, regno: string, report-no: int, damage-amount: int)

i) Create the above tables by properly specifying the primary keys and the foreign keys

ii) Enter atleast five tuples for each relation.

iii) Demonstrate how you

a) Update the damage amount for the car with a specific regno in the accident with report no 12 to 25000.

b) Add a new accident to the database.

iv) Find total number of people who owned cars that were involved in accidents in 2002

v) Find the number of accidents in which cars belonging to a specific model were involved

5. Consider the following database of students enrollment in courses and books adopted for each course.

STUDENT(regno: string, name: string, major: strong, bdate: date)

COURSE(course-no: int cname: string, dept: string)

ENROLL(reg-no: string, course-no: int, sem: int, marks: int)

BOOK-ADOPTION(course-no: int, sem: int, book-isbn: int)

TEXT(book-isbn: int, book-title: string, publisher: string, author: string)

i) Create the above tables by properly specifying the primary keys and the foreign keys

ii) Enter atleast five tuples for each relation.

iii) Demonstrate how you add a new text book to the database and make this book be adopted by some department.

iv) Produce a list of text books (include Course-no, book-isbn, book-title) in the alphabetical order for courses offered by the 'Compute Science' department that use more than two books.

v) List any department that has all its adopted books published by a specific publisher.

6. The following tables are maintained by a book dealer

AUTHOR(author-id: int, name: string, city: string, country: string)

PUBLISHER(publisher-id: int name: string, city: string, country: string)

CATLOG(book-id: int, title : string, author-id: int, publisher-id: int, category: int, year: int, price: int)

CATEGORY(category-id: int, description: string)

ORDER-DETAILS(order-no: int, book-id: int, quantity: int)

i) Create above tables by properly specifying the primary keys and the foreign keys.

ii) Enter atleast five tuples for each relation.

iii) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2010.

iv) Find the author of the book which has maximum sales.

v) Demonstrate how to increase price of books published by specific publisher by 10%

7. Consider the following database for BANK.

BRANCH(branch-name: string, branch-city: string, assets: real)

ACCOUNT(accno: int, banch-name: string, balance: real)

DEPOSITOR(customer-name: string, accno: int)

CUSTOMER(customer-name: string, customer-street: string, customer-city: string)

LOAN(loan-no: int, branch-name: string, amount: real)

ORROWER(customer-name: string, loan-no: int)

i) Create the above tables by properly specifying the primary keys and foreign keys.

ii) Enter atleast five tuples for each relation.

iii) Find all the customers who have atleast two accounts at the main branch.

iv) Find all customer who have an account at all the branches located in a specific city.

v) Demonstrate how t0 delete all account tuples at every branch located in specific city.

8. Consider the following database for ORDER PROCEESING.

CUSTOMER(cust-no: int, cname: string, city: string)

ORDER(orderno: int, odate: date, ord-amt: real)

ORDER_ITEM(orderno: int, itemno:int, qty: int)

ITEM(itemno: int, unitprice: real)

SHIPMENT(orderno: int, warehouseno: int, ship-date: date)

WAREHOUSE(warehouseno: int, city: string)

i) Create the above tables by properly specifying the primary keys and the foreign keys

ii) Enter atleast five tuples for each relation.

iii) List the order number and ship date for all orders shipped from particular warehouse.

iv) Produce a listing: customer name, no of orders, average order amount

v) List the orders that were not shipped within 30 days of ordering

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 8 Programs has to be prepared).

Note :

a) The candidate has to write two the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 8 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

IV SEM B Sc

CS4T1: OPERATING SYSTEM AND UNIX

Total Teaching Hours : 60 No of Hours / Week : 04

Unit-I

Introduction: Definition, Types of Operating Systems, Functions of Operating System, services, system components System call. Process Management: Process Concept, Process Scheduling, Inter process communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling, Algorithm evolution.

[12 Hours]

Unit – II

Process Synchronization and deadlocks: The Critical Section Problem, Synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, monitors, Dead locks – system model, Characterization, Dead lock prevention, avoidance and detection, Recovery from dead lock, Combined approach to deadlock handling.

[12 Hours]

Unit - III

Memory management: Functions, single contiguous, Partitioned memory management: multiple relocatable partitioned memory management, paging segmentation, demand paging virtual memory management. File Management: Concept, access methods, directory structures, allocation methods, free space management, secondary storage structure. Disk Management: Disk Structure & Scheduling methods, Disk management, Swap – Space management.

[12 Hours]

Unit-IV

History of Unix, salient features, Unix Components, types of shell, Internal and External commands, Files and File Organization- Categories of files, Unix file system, directories, file related commands, Directory related commands, wild cards, Printing and Comparing files. Ownership of files, File attributes File permissions and Manipulations, Standard I/O, Redirection, pipe, filter.

[12 Hours]

Unit-V

Introduction to vi editor, The three modes of the vi editor, Invoking vi editor, Configuring the vi environment, Regular expressions, the grep command, The process - parent and child process, process creation, process related commands, Shell Programming - shell script features, shell variables, writing and executing a shell script, positional parameters, Branching control structures- if, case etc., Loop control structures

– while, until, for, etc., Jumping control structures – break, continue, exit, etc., Integer and Real arithmetic in shell programs, Debugging scripts.

[12 Hours]

TEXT BOOKS

1. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", 7th Edition, Pearson Education, 2002.
2. M.G.Venkateshmurthy, "Introduction to UNIX & SHELL Programming", First Edition, Pearson Education, 2004.

REFERENCE BOOKS

1. Forouzan,"Unix and Shell Programming", 1st Edition,2008 Cengage Learning India
2. H.M.Deitel, "Operating Systems", Pearson Learning Solutions, 3rd Edition, 2003.
3. William Stallings, "Operating Systems", 6th Edition, Pearson Education, 2010.

CS4P1: Shell Programming in Unix Lab

PART - A

1. Write a menu driven program to calculate (i) Simple interest (ii) Compound interest
2. To print all prime numbers between m and n (m<n).
3. Reverse a given number and check whether it is palindrome or not.
4. Shell script to find maximum and minimum of given set
5. To count the number of vowels in a given string.
6. Create a file containing the following fields: student No., student name, age, sex, height and weight. Print all the details in a neat format.
7. Write a C program to generate and print the GCD and LCM of two integers.
8. Shell script to take two numbers as arguments and output their sum using (i) bc (ii) expr. Include error checking to test whether two arguments were entered.
9. Find out the occurrences of three consecutive and identical word characters (like aaa or bbb) using (i) grep and (ii) sed.
10. Shell script to display all the file permissions.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note :

a) The candidate has to write both the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 (5 Marks each)
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

V Sem B Sc

CS5T1: VISUAL PROGRAMMING

Total Teaching Hours: 52 No of Hours / Week : 03

Unit - I

Introduction to Visual Programming: The integrated Development Environment – menu bar, tool bar, from designer, project explorer, properties window, from layout window,

The VB editor. The form object: Properties, events and methods pf forms; Properties – Name, Captain, Backcolor, Borderstyle, controlbox, maxbutton, minbutton, moveable, startup position, height, width, left, top, scalemode, window, state; Events –load, unload, Clerk, Activate, Deactivate, Resize, methods – Show, hide, cls, Unload, print, Controls – Properties and events of different controls such as command buttons, labels, textboxes image controls, timer, horizontal and vertical scroll bars, option buttons, check boxes, frames lists and combo boxes. Predefined Dialog Boxes – MsgBox and InputBO

[13 Hours]

Unit - II

Programming: Data types, variables; declaration and scope arithmetic operations, Study of form and code modules, private and public procedures, Main procedure, Sub and Functions. Mathematical and string Functions; Branching and Looping Statement; If – Then, if –Then –Else and Nested If Statements; Select Case –different forms; For – Next, While – Wend and Do – Loops statements; Arrays- declaration. Static and dynamic arrays. Array Function, menus and toolbars-Creating menus and toolbars, Working with the menu editor, Designing Multiple Document interface forms. Microsoft common controls.

[13 Hours]

Unit - III

OOP methods and properties of an object, class Modules, Encapsultation and Inheritance characteristics Dynamic Link Libraries (DLLs) and Windows API; Designing Help files; File handling – Sequential ,Random access and Binary files, Database connectivity – DAO and ADO Tables and Queries, ActiveX Data objects.

[13 Hours]

Unit – IV

Visual C++ Programming: Objects-Classes-VC++Components – Resources-Event Handling – Menus – Dialog Boxes – Importing VBX Controls – Files – MFC File Handling – Document View Architecture – Serialization. Interfacing Other Applications – Multiple Document Interface (MDI) – Splitter Windows – Exception Handling – Debugging – Object Linking and Embedding (OLE) – Database Application – DLL- ODBC.

[13 Hours]

Text Books:

1. Gurumit Singh, “Visual Basic 6”, First Edition, Firewall Media, 2007.

Reference Books:

1. Charles Petzold, “Windows Programming”, 5th Edition, Microsoft Press, 1999.
2. Steve Holzner, “Visual C++ Programming”, Second Edition, PHI, 1994.
3. Go ttfried, “Programming with Visual Basic 6”, PHI, 2000.

CS5P1 : Visual Programming Lab

PART - A

1. Write a VB Program to design a simple calculator to perform addition, subtraction, multiplication and division(Use functions for the calculations).
2. Design a User Interface (UI) to accept the student details such as name, department and total marks. Validate the input data and calculate the percentage and division.
3. Design a VB application which has MDI and Child forms. Create a menu having the items such as file (New, Open),Format (Font, Regular, Bold ,Italic) and Exit in the MDI form. Also create a text box and use a Common Dialog Box control for changing the font, fore color and back color of the text box.

4. VB program to Encrypt and Decrypt a string. (Use Rnd() to generate the Encryption and Decryption keys).
5. Design a small Alarm Clock Application.
6. Write a VB Program to Validate the username and password form the database and display the appropriate message.(Use Data Control)
7. Design a VB application to record the employee details such as EmpId, EmpName, Designation and BaiscPay. Calculate the DA, HRA, Deduction and Gross Salary.(Make the necessary assumptions)Use Select .. case for decision making.
8. VB program to calculate the simple interest and compound interest. Use DLLs for the calculation.
9. VC++ program to create a Dialog box and display the position of mouse pointer within the dialog box.
10. VC++ program to create and load a simple menu in a Window.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note :

a) The candidate has to write both the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

CS5T2: OBJECT ORIENTED PROGRAMMING USING JAVA

Total Teaching Hours : 52 No of Hours / Week : 03

Unit - I

Introduction to JAVA: JAVA Evolution: Java History, Java Features, How Java Differs from C and C++, Java and Internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Support Systems, Java Environment. Overview of JAVA Language: Introduction, Simple Java program, More of Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style. Constants, Variables, and Data Types: Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Operators and Expressions: Introduction, Arithmetic Operators, Relational Operators Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Procedence of Arithmetic Operators, Type Conversion and Associativity, Mathematical Functions. Decision Making and Branching: Introduction, Decision Making with if Statement, Simple if Statement, The if…..else Statement, Nesting of if..else Statements, The else if Ladder, The Switch Statement, The ? : Operator. Decision Making and Looping: Introduction. The while

Statement, The do Statement, The for Statement, Jumps in Loops Labeled Loops.

[13 hours]

Unit -II

Classes, Arrays, Strings, Vectors and Interfaces: Classes, Objects and Methods: Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class Overriding Methods, Final Variables and Methods, Finalizer methods, Abstract Methods and Classes, Visibility Control. Arrays, Strings and Vectors: Arrays, One-dimensional Arrays, Creating an Array, Two - Dimensional Arrays, Creating an Array, Two – dimensional Arrays, Strings, Vectors, Wrapper Classes. Interfaces: Multiple Inheritance: Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

[13 Hours]

Unit - III

Packages, and Multithreaded Programming:

Packages: Putting Classes together: Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. Multithreaded Programming: Introduction, Creating Threads, Extending the Thread Class, Stopping and Blocking a thread, Life Cycle of a thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface. Managing Errors and Exceptions: Introduction, Types of Exception Handling Code, Multiple Catch Statements, Using Finally Statement, Throwing Our Own Exceptions, Using Exceptions for Debugging.

[13 Hours]

Unit - IV

Applet Programming, Graphics Programming, Input/Output:: Introduction, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable applet, Designing a Web Page, Applet Tag, Adding Applet to HTML File, running the Applet, More About HTML Tags, Displaying Numerical Values, Getting Input from the User. Graphics Programming: Introduction, The Graphics Class, Lines and rectangles, circles, and Ellipses, Drawing Arcs, Drawing Polygons, Lines Graphs, Using Control Loops in Applets, Drawing Bar Charts. Managing Input/Output Files in JAVA: Introduction, Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, Other Useful I/O Classes, Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Interactive Input and output, Other Stream Classes.

[13 Hours]

Text Books:

1. A.Balaguruswamy, "Programming with JAVA", A Primer, TMH, 1999.

Reference Books:

1. Thomas Boutel, "CGI programming in C and Perl", Addison – Wesley, 1996.
2. Jefry Dwight et al, Using CGI, Second Edition, Prentice Hall, India, 1997.
3. Patrick Naughton & Herbert Schildt, JAVA 2: The Complete Reference, THM, 1999.
4. Schildt, "JAVA The Complete Reference", 7th Edition.

CS5P2: JAVA PROGRAMMING LAB

PART - A

1. Write a program to find factorial of list of number reading input as command line argument.
2. Write a program to display all prime numbers between two limits.
3. Write a program to sort list of elements in ascending and descending order and show the exception handling.
4. Write a program to implement all string operations.
5. Write a program to find area of geometrical figures using method.
6. Write a program to implement constructor overloading by passing different number of parameter of different types.
7. Write a program to create student report using applet, read the input using text boxes and display the o/p using buttons.
8. Write a program to calculate bonus for different departments using method overriding.
9. Write a program to implement thread, applets and graphics by implementing animation of moving ball.
10. Write a program to implement mouse events and keyboard events.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note :

a) The candidate has to write both the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.

b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.

c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

VI Sem B Sc

CS6T1: WEB PROGRAMMING

Total Teaching Hours : 52 No of Hours / Week : 03

Unit - I

Fundamentals of Web: Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

[13 Hours]

Unit - II

Java Script: Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input; Control statements; Object creation and Modification; Arrays;

Functions; Constructor; Pattern matching using expressions; Errors in scripts; Examples.

[13 Hours]

Unit - III

Java Script and HTML Documents, Dynamic Documents with JavaScript, The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements.

[13 Hours]

Unit - IV

CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and tags, Conflict resolution. XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML Processors; Web services.

[13 Hours]

Text Books

1. Robert W Sebesta, "Programming the World Wide Web", 4th Edition, Pearson Education, 2008.

Reference Books

1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003.
4. Sklar, "The Web Warrior Guide to Web Design Technologies", 1st Edition, Cengage Learning India.

CS5P2: WEB PROGRMMING LAB

PART - A

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes, and so on). Write JavaScript code to count the number of elements in a form
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.

8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
    a) The first multiple choice list, displays the Major dishes available.
    b) The second multiple choice list, displays the Starters available.
    c) The single choice list, displays the Soft drinks available.
10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

PART – B

During practical examination the External and Internal examiners may prepare exam question paper related to theory syllabus apart from Part-A. (A minimum of 10 Programs has to be prepared).

Note:

a) The candidate has to write both the programs One from Part-A and other from Part-B and execute one program as of External examiner choice.
b) A minimum of 10 Programs has to be done in Part-B and has to be maintained in the Practical Record.
c) Scheme of Evaluation is as follows:

Writing two programs	- 10 Marks
Execution of one program	- 10 Marks
Formatting the Output	- 05 Marks
Viva	- 05 Marks
Record	- 05 Marks
Total	**- 35 Marks**

CS6T2 : COMPUTER NETWORKS

Total Teaching Hours : 52 No of Hours / Week : 03

Unit - I

Introduction: Growth of computer networking, Complexity in network system, Motivation and Tools: Resource sharing, Growth of the internet, probing the internet, interpreting the ping response, tracing a route. Transmission Media: Copper wires, glass fibers, radio, satellite, Geosynchronous satellites, low earth orbit satellites, Low earth orbit satellite arrays, Microwave, Infrared, Light from a laser. Local Asynchronous Communications: Introduction, the need for asynchronous communications, using electric current to send bits, standards for communication, baud rate, Framing and errors, Half and Full duplex asynchronous communication, the effect of noise on communication. Long distance Communication: Sending signals across long distances, Modem hardware used for Modulations and Demodulation, Leased analog data circuites, optical, radio frequency and dialup Modems, carrier frequencies and Multiplexing, baseband and bradband technologies, wave length division multiplexing, spread spectrum, time division multiplexing [13 hours]

Unit - II

Packets, Frames and Error Detection: Concept of Packets, packets and Time-division Multiplexing, Packets and Hardware Frames, byte Stuffing, transmission errors, Parity bits and Parity checking, error detection, Detecting errors with checksums, detecting errors with CRC, Burst errors, frame formats and error detection mechanism. LAN Technologies and Network Topologies: Direct point-to-point communications, Shared Communications channels, LAN Topologies, Ethernet, Carries sense on CSMA,

Collision Detection and Backoff wih CSMA/CD, Ring Topology and Token Passing, Self-Healing Token Passing Networks, ATM. Hardware addressing and Frame Type Identification: specifying a recipient, How LAN hardware uses addresses to filer packets, format of a physical addresses, broadcasting, Multicast addressing, identifying packet contents, frame headers and frame format. LAN Wiring, Physical Topology and Interface Hardware: speeds of LANs and computers, Network Interface Hardware, The connection between a NIC and a network, original thick Ethernet wiring, connection multiplexing, thin Ethernet wiring, twisted pair Ethernet, Network interface cards and wiring schemes, categories of wires. [13 hours]

Unit - III

Extending LANs: Fiber Optic Extensions, Repeaters, bridges, frame filtering, switching, Long-distance and Local Loop Digital Technologies: Digital telephony, Synchronous communication, SONET, ISDN, Asymmetric Digital Subscriber Line Technology, other DSL technologies, cable modem technology, upstream communication, Broadcast Satellite systems. WAN technologies and Routing: Large Networks and Wide Areas, Packet switches, forming a WAN, store and forward, Physical addressing in a WAN, Next-Hop forwarding, Source independence, Routing Table Computation, Shortest path computation in a Graph, distance vector routing, like-state routing, Example of WAN technologies. Network Characteristics: Network ownership, Network performance characteristics, Jitter. Protocols and Layering: the need for protocols, the seven layers, Stacks: Layered Software. [13 hours]

Unit - IV

Internetworking: internet architecture, A virtual Network, Layering and TCP/IP protocols. Internet Protocol Addresses, APR, IP Datagram's and Datagram Forwarding, IP Encapsulation, Fragmentation, and Reassembly, IPv6, ICMP, UDP, TCP, Internet routing, DNS, WWW, MAIL. [13 hours]

Text Books:

1. Douglas E Comer and M.S.Narayana, "Computer Networks and Internets", 5th edition, Pearson Education, 2013.

Reference Books:

1. Andrew S.Tanenbaum, "Computer Networks", Fifth Edition, Prentice Hall, 2012
2. Behrouz Ferouzan, "Introduction to Data Communications and Networking", TMH, 1999.
3. S. Keshav, "An Engineering Approach to Computer Networks", Pearson Education, 2nd Edition.

CS6P2: PROJECT LAB

Total Practical hours / week: 03 hours

Students are required to take up a problem and develop a system by making use of the existing infrastructure available in their respective colleges.

Scheme of Evaluation is as follows:

Project Demo	- 15 Marks
Project VIVA	- 15 Marks
Project Report	- 5 Marks
Total	**- 35 Marks**

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