Estd. 1962
NAAC 'A' Grade
MHRD-NIRF- 28th Rank

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दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

SU/BOS/Sci. & Tech/7400 **Date: 21/07/2018**

To,

The Principal/ Director,
All affiliated Engineering Colleges/ Institute,
Shivaji University, Kolhapur.

Subject : Regarding Guidelines, structure, of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program under Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University Authorities have accepted and granted approval to Guidelines, structure of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program to following branches under Faculty of Science and Technology:

B. Tech. Programme (Branch)

1.	Civil Engineering & Technology
2.	Mechanical Engineering & Technology
3.	Production Engineering & Technology
4.	Automobile Engineering & Technology
5.	Electrical Engineering & Technology
6.	Chemcial Engineering & Technology
7.	Electronics Engineering & Technology
8.	Electronics and Telecommunication Engineering & Technology
9.	Biotechnology Engineering & Technology
10.	Information Technology Engineering & Technology
11.	Environmental Engineering & Technology
12.	Computer Science Engineering & Technology

The revised syllabi shall be implemented from the academic year 2018-19 (i.e. from July 2018) onwards. A soft copy containing CBCS Guidelines, structure, and syllabus of First Year B. Tech. is enclosed herewith. The syllabus is also made available on university website www.unishivaji.ac.in.

Further, it is hereby informed that the question papers on the pre-revised syllabi shall be set for the examination to be held in October/November 2018 and April/May 2019. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl-: as above.

Copy to-

1) I/c Dean, Faculty of Science & Technology
2) Director, Examination and Evaluation
3) The Chairman, respective BOS / Co-ordinating Committee

} For information

4) O.E. 4 Section
5) Appointment Section
6) Eligibility Section
7) Meeting Section

} For information & necessary action .

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredided by NAAC 'A' Grade

Syllabus for

Bachelor of Technology

(B. Tech.) Program

(To be implemented from June, 2018 onwards)

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING AND TECHNOLOGY

Structure and Syllabus

(From the Academic Year 2018-2019)

(Course common to all branches except Architecture and Textile Engineering)

INSTRUCTIONS:

There are two groups in each semester:

1.Physics Group and

2.Chemistry Group

Allotment of groups to students:

a) Semester I: 50% students from each college will be admitted to Physics Group and remaining 50% will be admitted to Chemistry Group. The concerned College will decide the number and names of the students to be admitted in physics and chemistry groups and inform the same to the University.

b)Semester II: The students for Physics group in semester-I will be admitted to Chemistry Group in semester-II. The students for Chemistry Group in semester-I will be admitted to Physics Group in semester-II.

First Year Engineering and Technology – CBCS PATTERN (All Branches) (Sem I & II)

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME							
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL (Term wok)		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	%Min	Hours	Max	%Min
SEMESTER - I																		
1	BSC-P-101 / BSC-C-101	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-I-102	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-103	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-104	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-105	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-I-106	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-I-107	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
SEMESTER –II																		
1	BSC-P-201 / BSC-C-201	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-II-202	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-203	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-204	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-205	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-II -206	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-II-207	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
	TOTAL	34	34	34	2	2	2	12	24	24				1000			400	

CIE – Continuous Internal Evaluation ESE – End Semester Examination

Candidate contact hours per week : 30 Hours(Minimum)
Total Marks for B.Tech I. Sem I & II :**1400**
Theory and Practical Lectures : 60 MinutesEach
Total Credits for B.Tech.-I (Semester I & II) :**48**
IntheoryexaminationtherewillbeapassingbasedonseparateheadofpassingforexaminationofCIEandESE
There shall be separate passing for theory and practical (term work)courses
Non-Credit Self Study Course : Compulsory Civic Courses(CCC) **For Sem I: CCC – I :** Democracy, Elections and Good Governance
Non-Credit Self Study Course : Skill Development Courses (SDC) For Sem II: SDC – I : Any one from following (i) to(v) i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) Resume, Report & proposal writing

Note:
1.BSC : Basic Science Course arecompulsory.
2.HM : Humanities and Management arecompulsory.
3.ESC : Engineering Science Course **: ESC- P**for courses (subjects) are mandatory**Physics** group, while **ESC – C** courses (subjects) are mandatory for **Chemistry**group.
4.There will be two groups for Sem I & II Physics and Chemistry. The Candidate's those opting Physics group in Sem I shall appear for Chemistry group in Sem II andVice-versa.
5.ESC-W: Engineering Science Course-Workshop arecompulsory.

Course List

Semester – I

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-101	Engineering Physics	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-P-103	Basic Electrical Engineering	4
4.	ESC-P-104	Basic Civil Engineering	4
5.	ESC-P-105	Engineering Graphics	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-101	Engineering Chemistry	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-C-103	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C-104	Applied Mechanics	4
5.	ESC-C-105	Basic Mechanical Engineering	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Semester II

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-201	Engineering Chemistry	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-C203	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C204	Applied Mechanics	4
5.	ESC-C205	Basic Mechanical Engineering	4
6.	HM-II-206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-201	Engineering Physics	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-P-203	Basic Electrical Engineering	4
4.	ESC-P-204	Basic Civil Engineering	4
5.	ESC-P-205	Engineering Graphics	4
6.	HM-II -206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester I and II
EngineeringPhysics

SECTION – I

Unit 1.Diffraction and Polarization of Light :(12 Marks)(7)

Diffraction : Diffraction- Concept and types (Fresnel and Fraunhofer diffraction), Diffraction grating – construction and theory, resolving power of planetransmission grating.

Polarization:

Introduction, double refraction, Huygens' theory (positive and negative crystals), Optical Activity, Specific Rotation, Laurent's half shade polarimeter.

Unit 2. Laser and FibreOptics:(12 Marks)(7)LASER :

Absorption, spontaneous emission, stimulated emission, pumping, population inversion, Ruby laser, characteristics of laser, Holography (construction and reconstruction)

Fibre Optics:

Total Internal Refection, structure of opticalfibre, acceptance angle, acceptance cone, numerical aperture and fractional refractive index change (noderivation), fibre optic communication system, advantages of optical fibres.

Unit 3. Sound: (11 Marks)(7)

Conditions for good acoustics, Reverberation, Reverberation time, Sabine's formula for reverberation time (no derivation), Absorption coefficient, Factors affecting architectural acoustics and their remedy.

SECTION – II

Unit 4.Crystal Physics: (12 Marks)(7)

Space Lattice, Basis and Crystal structure, Unit cell, Seven crystal system, number of atoms per unit cell, coordination number, atomic radius, packing fraction, relation between density and lattice constant, Miller indices - procedure, features and sketches for differentplanes, symmetry elements of cubic crystal,Bragg's law for X-ray diffraction.

Unit 5. Physics of Nano-materials: (12 Marks)(7)

Concept- Nanomaterial, Nanoscience and Nanotechnology, production techniques(Top down and bottom up), Ball milling and Colloidal technique for synthesis of nano particles, Types of Nanomaterial, Tools- Scanning Tunneling Microscope and Atomic Force Microscope, properties and applications of nano-materials.

Unit 6.QuantumMechanics (11 Marks)(7)

Wave-particle duality of light, dual nature of matter (De-Broglie's concept of matter waves) Wavelength of matter wave in terms of K.E. and P. D., Properties of matter waves, Heisenberg's uncertainty principle for position and momentum, Compton Effect (Statement, explanation and experimental verification).

List of Experiments;

Minimum 8 experiments should be performed from the following list.

01. Bi-prism experiment
02. Diffraction at Cylindrical obstacle.
03. Calculation of divergence of LASER beam.
04. Determination of wavelength of LASER using diffraction grating.
05 Wavelength of different spectral lines of mercury using grating.
06. Polarimeter.
07. Verification of inverse square law of intensity of light.
08. Resolving power of Telescope
09. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cubic crystal.
12. Determination of 'd' (interplaner distance) using XRD pattern.
13. Study of Planes with the help of models related Miller Indices.
14. Determination of e/m of an electron
15. R. P. of grating

References :

1. R. K. Gaur & Gupta S. L, Engineering Physics -DhanapatRai Publication.
2. M. N. Avadhanulu& P. G. Kshirsagar - A Text Book of EngineeringPhysics -S. Chand Publication.
3. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
4. Subramanyam&BrijLal, A Text Book of Optics –S. Chand & Company (P.) Ltd.
5. B. K. Pandey and S. Chaturvedi- EngineeringPhysics, Cengage Learning-2012
6. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties,Eastern Ltd,, New Age International Ltd.
7. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8^{th}Edtion).
8. V. Rajendran – Engineering Physics- Mc. Graw Hills
9. Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
10. Vijay Kumari- Engineering Physics, Vikas Publications
11. ResnickHalliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
12. ResnickHalliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
13. Hitendra K. Malik, A. K. Singh – Engineering Physics - Tata Mc. Graw Hills Education Private Ltd.
14. A. Beiser – Concepts of Modern Physics - Tata Mc. Graw Hills
15. L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I

EngineeringMathematics-I

SECTION I

Unit 1: Matrices and Solution of Linear System Equations(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Rank of matrix: definition, normal form and echelon form
2. Consistency of linear system equations
3. System of linear homogeneous equations
4. System of linear Non-homogeneous equations

Unit 2: Eigen Values and Eigen vectors (7)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Eigen Values
2. Properties of Eigen Values
3. Eigen vectors
3. Properties of Eigen vectors
4. Cayley-Hamilton's theorem (Without proof)

Unit 3: Complex Numbers (6)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. De Moivre's Theorem (Without proof)
2. Roots of complex numbers by using De Moivre's Theorem
3. Expansion of sinnθ and cosnθ in powers of sinθ and /or cosθ.
4. Circular functions of a complex variable - definitions

5Hyperbolic and Inverse Hyperbolic Functions- definitions .

SECTION II

Unit 4: Numerical Solution of linear simultaneous equations: (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Gauss elimination method
2. Gauss-Jordan method
3. Jacobi's iteration method
4. Gauss-Seidel iteration method

Unit 5: Expansion of Functions and Indeterminate forms: (7)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Maclaurin's theorem
2. Standard expansions
3. Taylor's theorem
4. Indeterminate forms and L' Hospital's rule

Unit 6: Partial Differentiation:(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Partial derivatives: Introduction
2. Total derivatives
3. Differentiation of implicit function
4. Euler's theorem on homogeneous function of two variables
5. Jacobian and its Properties .
6. Maxima and Minima of functions of two variables

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
3. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar, Cengage Learning.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. Numerical methods by Dr. B. S. Grewal, Khanna Publishers, Delhi.
6. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,NewDelhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Basic Electrical Engineering

SECTION I

Unit1: Analysis of D.C. circuits: (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Concept of E.M.F, Potential Difference, Current, Resistance, Ohm's Law Kirchhoff's laws, mesh and node analysis

(Numerical on Mesh and Nodal Analysis of Two loops)

Unit 2:Magnetic circuits:(8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Concept of mmf, reluctance, magnetic flux, Magnetic Flux density, Magnetic field strength, BH curve, magnetic leakage, fringing, Comparison of Electric and Magnetic circuit, series magnetic circuits (Theoretical Concepts only).

Unit 3: Single phase AC Circuits: (8) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Fundamentals of Alternating quantities, Faraday's Law, Types of Induced E.M.F ,Generation of sinusoidal voltage, concept of R.M.S. & Average value, form factor, Peak Factor, Pure Resistive, Inductive, Capacitive , R-L, R-C, R-L-C series circuits, powers, Significance of power factor.

(Numerical Treatment on Series R-L, R-C, R-L-C circuits)

SECTION II

Unit 4: Three phase A.C. Circuits (7) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Advantages of 3 phase system, Generation of 3 phase AC supply, balanced 3 phase load, relation between line and phase quantities for star connected circuit and delta connected circuit.

Unit 5:Earthing and lamps: (7) (Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Necessity of Earthing, Earthing methods, Fuse (rewireble and HRC). MCB, Incandescent Lamp, Fluorescent tube, CFL, LED lamp, Mercury vapour lamp, single line diagram of electrical systems.

Unit 6: Single phase Transformer: **(8)** (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Construction, operating principle, Types, emf equation, Ratios of voltage and current, operation on no load and with load, power losses, efficiency, voltage regulation, applications.

(Numerical Treatment on E.M.F Equations &Transformer losses and Efficiency)

List of Experiments

Minimum 8 experiments should be performed from the following list.

1. Laboratory Sessions covering,General Introduction to Electrical Engineering laboratory, Experimental Set ups, Instruments etc.. Electrical Symbols.
2. Electric Shocks and precautions against shocks(Do's and Don'ts) .
3. Study of Ohm's Law.
4. Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
5. B-H curve of magnetic material.
6. Study of Faraday's law.
7. Determination of Reactance's for Series R-L- C Circuit.

8. Measurement of active and reactive power in balanced 3-phase circuit using Two-watt meter method.
9. Study of Basic methods of Earthing. Use of Fuse and Miniature Circuit breaker.
10. Study of different luminaries including Incandescent lamp, Mercury vapor lamps, fluorescent tube, CFL, and LED lamps.
11. Polarity and Ratio Test for single Phase Transformer.
12. Pre-determination of efficiency and regulation by Open Circuit and Short circuit tests on single phase transformer.
13. Determine the Efficiency of single Phase Transformer by Direct Loading Test

Reference books:

1. P.V.Prasad and S.Shivan Raju – Electrical Engineering concepts and Applications – Cengage learning.
2. B.L.Theraja – Electrical Technology vol.1. – S.Chand.
3. B.L.Theraja – Electrical Technology vol.2. – S.Chand.
4. NagrathI.J. and D.P.kothari – Basic Electrical Engineering(2001) – Tata McGraw Hill.
5. .BharatiDwivedi and AnurasgTripathi – Fundamentals of Electrical Engineering – Willey Precise

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Civil Engineering

SECTION I

Unit 1: Relevance of Civil Engineering and Building Planning(7)

Introduction, branches of civil engineering, application of civil engineering inother alliedfields.Principles of planning, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement.

Unit 2: Components of Building (7)

A) Sub-structure: Types of soil and rocks as foundation strata, concept of bearing capacity,types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.

B) Super-structure: Elements of super-structures and their functions

Unit 3: Building Materials and Design (7)

Use and properties of the following materials--Concrete – ingredients and grades, plain and reinforced cement concreteand ready mixconcrete, bricks, steel, timber, roofingmaterials etc.

Introduction to types of loads, load bearing and framed structures.

SECTION II

Unit 4: Linear and Angular Measurements(7)

Principles of surveying, Classification of surveys, Chain Surveying, Introduction to metricchain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book, Chain and compass survey, Meridian, bearing and its types, system of bearing, Types of compass: prismatic and surveyor's compass. Calculation

Ofincluded angles, correction for local attraction.

Unit 5: Leveling (7)

Terms used in leveling, use of Dumpy level and Auto Level, temporary adjustments.Methodsof reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.Introduction and use of EDM's with special reference to Total Station.Measurement of area by planimeter – mechanical and digital.

Unit 6: Introduction to Transportation, Environmental and Irrigation Engineering (7)

Components of rigid and flexible pavement, components of railway track (Broad Gauge)Components of water supply scheme (flow diagram), Necessity of Irrigation, Types of Dams (Earthen and Gravity Dam)

Term work:

Student can choose either Model A or Model B for performing practical

Model A

List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.

3. Plotting of closed traverse by prismatic compass.
4. Reduction of levels by rise and fall method.
5. Finding out gradient of line by rise and fall method
6. Measurement of area by mechanical
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Model B

List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.
3. Plotting of closed traverse by surveyor's compass.
4. Reduction of levels by collimation plane method.
5. Finding out gradient of line by collimation plane method.
6. Measurement of area by digital planimeter
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Reference Books:

1. Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications.
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
3. Surveying by N. Basak, Tata Mc-Graw Hill Publication.
4. Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication.
5. Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication.
6. Irrigation Engineering by B. C. Punmia, DhanpatRai Publications

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringGraphics

SECTION I

Unit1: Fundamentals of Engineering Graphics& Engineering Curves (6)

A) Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Layout of drawing sheets, different types of lines used in drawing practice, Dimensioning system as per BIS (Theoretical treatment only)

B) Engineering curves: Construction of regular polygons (up to hexagon). Construction of Ellipse – (Directrix-Focus & Arcs of circle Method) Parabola-(Directrix-Focus & Rectangle Method) , Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Archimedian spiral and Cycloid only. (10 marks)

Unit 2: Projections of lines & Planes (9)

A) Projections of lines: Introduction to First angle and third angle methods of projection.
Projections of points on regular reference planes. Projections of horizontal, frontal and Profile lines on regular and auxiliary reference planes. Projection of oblique lines it's True length and angle with reference planes by rotation and auxiliary plane method. Concept of grade and bearing of line.

B) Projections of planes: Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes). Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. (Circle and regular polygon) (15 marks)

Unit 3: Projections of solids (5)

Projections of Prisms, Pyramids, Cylinder and Cones inclined to both referenceplanes(Excluding frustum and sphere)(10 marks)

SECTION- II

Unit 4: Orthographic Projections (7)

Orthographic views: lines used, Selection of views, spacing of views, dimensioning and sections. Drawing required views (any two views) from given pictorial views (Conversion of pictorial view into orthographic view) including sectional orthographic view. (15 marks)

Unit 5: Isometric projections (6)

Isometric projections: Introduction to isometric, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. (10 marks)

Unit 6: Development of plane and curved surfaces (7)

Development of plane and curved surfaces: of the solids, Prisms, Pyramids, Cylinders and Cones along with cutting planes (Solids in simple position only). (10 marks)

Note: The above syllabus is to be covered according to the first angle method of projection.
Self-Study: Geometrical constructions and free hand sketches**,** Missing Views

Term work:

The following six sheets are to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

1. Engineering curves	01
2. Projections of lines and planes	01
3. Projections of solids	01
4. Orthographic projections	01
5. Isometric projections	01
6. Sections of solids and development of surfaces	01

Reference Books:

1. Engineering Drawingby N. D. Bhatt, Charotor Publication House, Bombay
2. Fundamentals of Engineering by W. J. Luzadder, Drawing, Prentice Hall of India.
3. Engineering Design and Visualization by Jon M.Duff,William A. Ross, CENGAGE Learning
4. Machine Drawing by N. D. Bhatt, Charotor Publication House, Bombay.
5. Graphic Science by French and Vierck, Mc-Graw Hill International.
6. Engineering Drawing and Graphics by K. Venugopal, New Age Publication
7. A text book of Engineering Drawing by R. K. Dhawan, S. Chand and Co.
8. Machine Drawing by K. L. Narayana, New Age Publication
9. Engineering Drawing by N. B. Shaha and B. C. Rana, Pearson Education.
10. Engineering Drawing and Graphics Using AutoCAD by T. Jeyapoovan, Vikas Publication.
11. Engineering Drawing by Prof. Amar Pathak, WIELY India Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I
Professional Communication-I

Unit 1: Understanding Communication **(3)**

1. Introduction, nature and importance
2. Process of communication
3. Basic types of communication- Verbal and Non- verbal
4. Barriers and filters of communication

Unit 2: Grammar and Vocabulary **(2)**

1. Forms of Tenses
2. LSRW skills
3. Developing vocabulary (synonyms, antonyms, confused words etc.)

Unit 3: Phonetics **(2)**

1. Understanding Phonetics and its alphabets
2. Transcription practices

Unit 4: Developing Oral Skills **(3)**

1. Importance and techniques of spoken language.
2. Techniques of formal speech, meetings, Elocution, Extempore etc.

Unit 5: Professional Correspondence **(4)**

1. Importance, language and style, formats (British & American)
2. Letter Writing – Simple letter (seeking permission regarding absence etc.),
3. Preparation of technical events information broacher and manuals.

Term Work: Minimum 8 should be performed from the following list.

1. Elocution
2. Vocabulary building
3. Phonetic Alphabets (Listen & repeat)
4. Pronunciation
5. Fluency Tips
6. Extempore
7. Teamwork- story making
8. Effective reading (newspaper articles)
9. Active listening (memorizing)
10. Letter writing
11. Situational conversation

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi, Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University Press New Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press New Delhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-I

Unit 1: Safety (3)

Concept of accidents, causes of accidents, safety precautions while working in shop, safetyequipments and their use.

Unit 2: Measuring Instruments (3)

Brief introduction to instruments like – Steel rule, Calipers, Vernier Caliper, Micrometer, DialGauge, Vernier height Gauge etc. Least counts, common errors and care while using them, Use ofmarkinggauge, 'V'block and surface plate.

Unit 3: Smithy (4)

Introduction to smithy operations like- bending, forming, upsetting, drawing. Smithy toolshammer,hot & cold chisel flatters, tongs, anvil etc.

Unit 4: Fitting (4)

Study of various tools like- files, drills, taps, dies. Fitting operations.

Term work:

The term work consists of assignment on safety, measuring instruments, Smithy and fitting.
Every student should perform,

1. Smithy
One job in smithy involving upsetting, Drawing, bending such as- Hook, peg, square headedbolt etc.

2. Fitting
One job Male/Female fitting with operations- Marking, cutting, drilling, tapping filing etc.

Reference Books:
1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop Technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringChemistry

Unit 1: Water **(7)**

Introduction, impurities in natural water, water quality parameters total solids, acidity, alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of water types of hardness, units of hardness, ill effects of hard water in steam generation in boilers (scale & sludge formation), numerical on hardness, treatment of hard water (ion exchange and reverse osmosis).

Unit 2: Instrumental methods of chemical analysis **(7)**

Introduction, advantages and disadvantages of instrumental methods-----

A)Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law),Single beam spectrophotometer (schematic, working and applications).

B)Chromatography: Introduction, types, gas-liquid chromatography (GLC), basic principle, instrumentation and applications.

Unit 3: Advanced materials **(7)**

A)Polymers: Introduction, plastics, thermo softening and thermosetting plastics, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, Conducting polymers and Biopolymers(Introduction, examples and applications.)

B)Composite materials: Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) and glass reinforced plastic (GRP).

SECTION II

Unit 4: Fuels(7)

Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericalproblems on Bomb and Boy's calorimeter.

Unit.5: Corrosion: **(7)**

Introduction, causes, classification, atmospheric corrosion (oxidation corrosion), electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection,cathodic protection, Protective coatings-hot dipping (galvanizing and tinning,), electroplating.

Unit 6: Metallic materials & Green Chemistry **(7)**

A)Metallic materials: Introduction, Alloy- definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high), stainless steels. Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico).

B)Green Chemistry: Definition, Twelve principles of Green Chemistry.

Term work:

List of Experiments:

Minimum 8 experiments should be performed from the following list out of which two experiments should be demonstrative on instrumental methods.

1. Determination of acidity of water.
2. Determination of alkalinity of water.
3. Determination of chloride content of water by Mohr's method.

4. Determination of total hardness of water by EDTA method.
5. Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
6. Preparation of urea-formaldehyde resin.
7. Preparation of phenol-formaldehyde resin.
8. Determination of percentage of copper in brass.
9. Estimation of zinc in brass solution.
10. Determination of rate of corrosion of aluminium in acidic and basic medium.
11. Demonstration of pH meter.
12. Demonstration of photo-colorimeter / spectrophotometer.
13. Demonstration of paper chromatography.

Reference books:

1.Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company Ltd., New Delhi.
2.A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.
3.A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.
4.Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.
5.Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.
6.A text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (Pvt.) Ltd, Delhi.
7.Engineering Chemistry by Wiley India.
8.Engineering Chemistry by RenuBapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Fundamentals of Electronics and Computer

Unit 1: Semiconductor Devices and Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Semiconductor Diode, Half wave, Full wave, Bridge rectifier, Voltage Regulator Using Zener Diode,BJT: characteristics, CE configuration, CE as an amplifier. Load Line, Operating Point, Leakage Currents, Saturation and Cut off Mode of Operations.

Unit 2: Digital Electronics (7)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Logic Gates, Boolean algebra, Comparison of Specifications of Logic Families, Combinational Logic, Half Adder, Full Adder, Multiplexer, De-Multiplexer.

Unit 3: Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Transducers: for Displacement (LVDT), Temperature (RTD), Pressure (Strain Gauge), Speed (Shaft Encoder), Range, Specifications and Limitations.

B) Appliances: Operation of Appliances: Digital Thermometer, Weighing Machine, Washing Machine, Microwave Oven and Tachometer.

SECTION II

Unit 4: Computer Basics and Hardware (5)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Generations & Classification of Computers.

B) Computer System Architecture– CPU, Input Unit, Output Unit, Storage Unit.

C) Applications of Computers.

Unit 5: Data Representation and Computer Software (8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

A) Data Representation In Computer: Types Of Number System – Binary, Octal, Decimal, Hexadecimal & Their Conversions, Coding Schemes – ASCII, Unicode.

B) Computer Software:

A) Operating System: Types Of Operating System, Functions, Unix/Linux Commands: Listing, Changing, Copying, And Moving Files & Directories (ls, cd, cat, mkdir, rmdir)

B) System Software: Assembler, Interpreter, Compiler.

C) Application Software's: Word Processor, Spreadsheets, Presentation andtheir Applications.

Unit 6: Computer Programming and Networks (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Computer Programming: Program Development Cycle, Algorithm, Flowchart, Programming Control Structures – Sequence, Selection, and Repetition.

B) Introduction to Computer Networks: Definition Of Computer Network, Need, Standards: OSI, TCP/IP, Types of Networks: LAN, WAN, MAN, Network Topologies.

Term work: FUNDAMENTAL OF ELECTRONICS

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Testing of Electronic components- resistors, capacitors, inductor, diode, transistor, LED and Switches using multi-meter &C.R.O.
2. V-I Characteristics of PN junction diode and Zener diode.
3. Study of Half and Full wave rectifiers and their comparison.
4. Study of Frequency response of CE amplifier.
5. Study of truth tables of logic Gates: OR, AND, NOT, NAND, NOR, EXOR.
6. Study of MUX/DEMUX.
7. Measurement of Displacement using LVDT/strain Gauge.
8. Measurement of Temperature using any transducer.

Self-Learning Activities: Different types of Communication systems & Communication Media.

Term work: FUNDAMENTAL OF COMPUTER

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Study of computer system – Internal Components & peripherals.
2. Use of Unix/Linux commands & create a file using any editor in Linux.
3. Create a document using any word processor (In Linux (open office) /Windows (Microsoft office).
4. Use any spreadsheet application to manipulate numbers, formulae and graphs (In Linux/Windows).
5. Use any power point presentation application and create a professional power point presentation using text, image, animation etc. (In Linux/Windows).
6. An assignment based on use of Internet and Web for searching and downloading Technical information.
7. Study of Tablet and Android Operating System Features and applications.

Text Books:

1. A Text Book of Applied Electronics by R S Sedha, S. Chand
2. Basic Electronics Engineering by Vijay Baru, RajendraKaduskar, S T Gaikwad (Wiley/ DREAMTECH)
3. Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH Publication.
4. Principle of Electronics by V.K. Mehata, S. Chand
5. Electronic Instrumentation by H. S. Kalasi, Tata McGraw Hills Publication

Reference Books:

1) Electronics Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (Pearson Education Publication)
2) Fundamental of Digital Circuits by A. Anand Kumar (PHI- Publication)
3) Fundamental of Electronics Engineering by R.Prasad(CENGAGE- Learning)
4) Introduction to Information Technology, ITL Education Solutions LTD. Pearson Education
5) Fundamentals of Computers by V. Rajaram, PHI Publications.
6) UNIX concepts and applications by Sunitabha Das, TMGH.
7) Computer FundamentalsArchetucture and Organization by B.Ram New Age International Publishers.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Applied Mechanics

Unit 1: Fundamentals of Statics (7)

Basic Concepts and Fundamental Laws, Force, Moment and Couple, System of Forces, Resultant, Resolution and Composition of Forces, Varignon's Theorem, Law of Moments.

Unit 2: Equilibrium (7)

Lami s' Theorem, Free Body Diagram, Equilibrium of Forces, Equilibrium conditions, Surface friction for bodies on horizontal and inclined planes.

Beams: Types of Loads, Types of supports, Analysisof Simple beams, Virtual work method for support reactions.

Unit 3: Centroid and Moment of Inertia (7)

Centroid and Center of Gravity, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.

SECTION II

Unit 4: Kinetics of Linear (8)

Introduction to Kinematics of Linear motion (no numerical on kinematics), Kinetics of linear motion, Newton's Laws, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal

Unit 5: Kinetics of Circular Motion (8)

Introduction to Kinematics of Circular motion (no numerical on kinematics), Rotation with constant and variable angular acceleration, centripetal and centrifugal force, condition of skidding and overturning.

Unit 6: Impact and Collision (5)

Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution,Numerical on Direct central Impact.

Term work:

Student can choose either Model 1 or Model 2 for performing practical

Model 1	Model 2
A) Experiments:	
1. Law of polygon of forces	**1.** Law of polygon of forces
2. Jib crane	**2.** Jib crane
3. Bell crank lever	**3.** Bell crank lever
4. Support Reactions of Beam	**4.** Support Reactions of Beam
5.Fleture's Trolley	**5.** Centrifugal force
B) Graphics Statics: (To be solved on A3 sheet)	
1. To find Resultant - 3 problems	1. To find Resultant - 3 problems
2.To find support reactions - 3 problems	**2.**To find support reactions - 3 problems
C) Home Assignments	
At least one assignment on each unit with minimum 5 numericals	At least one assignment on each unit with minimum 5 numericals

Reference Books:

1.Engineering Mechanics by S. S. Bhavikattis, New Age International Pvt. Ltd.
2.Engineering Mechanics by R. K. Bansal and Sanjay Bansal.
3.Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc-Graw Hill Publication.
4.Engineering Mechanics by Manoj K Harbola, Cengage Learning
5.Engineering Mechanics by K. I. Kumar, Tata Mc-Graw Hill Publication
6.Engineering Mechanics by S. B. Junnerkar.
7.Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
8.Applied Mechanics by S. N. Saluja, Satya Prakashan, New Delhi.
9.Engineering Mechanics by Statics and Dynamics by Ferdinand Singer, Harper and Row Publications
10.Engineering Mechanics by R. S. Khurmi, S. Chand Publications
11.Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian,VikasPublishing House
12) "Applied Mechanics- Dynamics &Statics " by I.B.Prasad, Khanna Publisher, Delhi

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Mechanical Engineering

Unit1:Thermodynamics(7)

Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy,First Law of Thermodynamics, Application of First Law to steady Flow processes,Limitations of First Law (Numerical Treatment) Statements of Second Law of Thermodynamics.(12 marks)

Unit 2: Introduction to I C Engine (7)

Carnot Engine, Construction and Working of C.I. and S.I., Two stroke, Four Stroke Cycles,Air standard cycles- Carnot Cycle, Joule Cycle, Otto Cycle, Air Standard efficiency (DescriptiveTreatment only) (12 marks)

Unit 3: Introduction to Refrigeration and Air Conditioning (6)

Carnot refrigerator, Refrigerant types and properties, Vapour compression and vapourabsorption system, solar refrigeration, Window Air Conditioning, Psychometric properties ofmoistair, Applications of refrigeration and air conditioning (Descriptive Treatment only).(11 marks)

Unit4:EnergySources and power plants (7)

Renewable and nonrenewable, Solar-flat plate collector, concentric collector–Parabolic andcylindrical, Photovoltaic cell, Wind, Hydropower plant, Steam Power plant,Bio-gas, Bio-Diesel (Descriptive Treatment only). (12 marks)

Unit 5: Mechanical Power Transmission and Energy conversion devices(7)

Type of Belt and belt drives, chain drive, Types of gears and gear Trains, (Numerical Treatment on belt drive), Construction, workingand applications of centrifugal Pump, Reciprocating compressor and Peloton wheel Turbine.(12 marks)

Unit 6: Manufacturing Processes (6)

Introduction to manufacturing processes - Casting Process, Steps involved in castingprocesses, and their applications, Metal removing processes (Lathe, milling & drilling operations) Metal JoiningProcesses – Arc welding, soldering and brazing and their applications.(11 marks)

Term Work:

List of experiments: Minimum 8 experiments should be performed from the following list--

1. Demonstration of I.C. engine
2. Demonstration of Two stroke and four stroke engine
3. Demonstration of vapor compression refrigeration system and window airconditioner.
4. Demonstration of Solar water heating system.
5. Demonstration of Steam or Hydroelectric Power Plant
6. Demonstration of Diesel power plant
7. Demonstration of types of Gears and gear trains.
8. Demonstration of pumps and compressor.
9. Demonstration of hydraulic turbine
10. Demonstration of metal joining processes.
11. Demonstration of metal removal processes
12. Industrial visit based on syllabus.

Reference Books:

1. Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication
2. Non-Conventional Sources of Energy by G.D. Rai, Khanna Publication
3.Engineering Thermodynamics by R.Joel, The English Language Book Society.
4.Engineering Thermodynamics by Achultan, Prentice Hall of India.
5.Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi.
6.Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
7.Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons.
8. Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication
9. Elements of Workshop Technology, Vol.I and II by HajaraChoudhari, Media Promoters
10. Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.
11.Energy Technology by S. Rao and Dr.B.B. Parulekar, Khanna Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

EngineeringMathematics-II

SECTION-I

Unit 1: Ordinary Differential Equations of First Order and First Degree (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Linear differential equations
2. Reducible to Linear differential equations
3. Exact differential equations
4. Reducible to Exact differential equations

Unit 2: Applications of Ordinary Differential Equations of First Order and First Degree (6)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1.Applications to Orthogonal trajectories (Cartesian and Polar equations)
2. Applications to Simple Electrical Circuits
3. Newton's law of cooling

Unit 3: Numerical Solution of Ordinary Differential Equations of First Orderand First Degree(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)**(8)**
1. Taylor's series method
2. Euler's method
3. Modified Euler's method
4. Runge-Kutta fourth order formula

SECTION-II

Unit 4:Numerical Solutions Of Algebraic and Transcendental Equations (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Bisection Method
2. Secant Method
3. Newton Raphson Method

Unit 5: Special Functions (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks) 1. Gamma function and its properties
2. Beta function and its properties
3. Error function and its properties

Unit 6: Multiple Integration and its applications: (8)
(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Double Integrals and evaluation
2. Change of order of integration
3. Change into Polar Coordinates
4. Area enclosed by plane curves
5. Mass of a plane lamina

General Instructions:
1. Batch wise tutorials are to be conducted. The number of students per batch should be asperthe Universitypattern for practical batches.

2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.-I by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
2. A text book of Applied Mathematics, Vol.-II by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
3. Dr. B. S. Grewal - Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers,Delhi.

Reference Books:

1. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publications, NewDelhi
2. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
3. Advanced Engineering Mathematics by H. K. Dass.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. A textbook of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.
6. A textbook of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-II

Unit 1: Welding (4)

Types of welding – gas welding, arc welding, resistance welding, Welding equipment's,welding of various metals, electrode classification and coding, welding joints.

Unit 2: Carpentry (4)

Introduction, Classifications of wood, common varieties of Indian timber, carpentry toolslike- Marking tools, cutting tools, planes, striking tools, holding tools. Carpentry operations- marking,sawing,chiseling, grooving etc. carpentry joints.

Unit 3: Sheet metal work (4)

Specifications of metal sheets, working tools, sheet metal operations like-cutting, bending,folding, punching, reverting and joining by brazing and soldering.

Unit 4: Air pollution: (2)

Air pollution due to automobiles, causes, PUC testing.

Term work:

The term work consists of assignment on Welding, Carpentry, Sheet metal work, Airpollution.
Every student should perform---

1. Welding: One job on Arc welding- Lap / Butt Joint etc. (For individual student)
OR
Table, Shoe stand, Bag stand etc. (For 4-6 students)

2. Carpentry :One composite job involving dovetail joint, T joint, cross halving joint, pen stand etc.(Forindividual student)
OR
Table, Teapot, Stool etc. (For 4-6 students)

3. Sheet metal Work:
One job on commercial items such as Dust bin, funnel, tray etc.

Reference Books:

1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.
6. I.C. Engines by Mathur& Sharma, Dhanpat Rai Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

Professional Communication-II

Unit 1: Developing Writing Skills(3)

1. Importance of technical writing
2. Report Writing:

a) Techniques of Report Writing
b) Methods of data collection
c) Types of Report Writing- Survey, Inspection and Investigation

Unit 2: Behavioral Skills(5)

1. Understanding Self (SWOT analysis)
2. Attitude Building/ Developing Positive attitude
3. Decision Making Skills
4. Leadership Skills
5. Stress Management
6. Time Management
7. Team Work

Unit 3: Presentation Skills(2)

1. Importance & techniques
2. Presenting yourself professionally

Unit 4: Career skills (4)

1. Corporate Manners and Etiquettes
2. Planning and Managing Career
3. Job Application and Resume
4. Interview: Techniques& skills
5. Group Discussion
6. Debate

Term Work: Any 8 out of the following should be conducted

1. Group Discussion (lab session/class room activity)
2. Mock Interview
3. Report writing (lab session/class room activity)
4. Paragraph writing on current technical writing
5. Presentation on current affairs
6. Developing Professional Telephonic skills
7. Exercise of Application writing and Resume writing
8. Practice of Case Study
9. Team building activities
10. Report writing (3 types)
11. Introduction and use of modern communication techniques
12. Computer aided presentation of a project report (PPT)

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication byJane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi,Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University PressNew Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press NewDelhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, PearsonPublication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

SECOND YEAR COMPUTER SCIENCE AND ENGINEERING(AIDS) - CBCS PATTERN

Semester III

Sr No	Course/Subject /Title	TEACHING SCHEME									EXAMINATION SCHEME										
		Theory			Tutorial			Practical			Theory				Practical			Term Work			
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN	
1	BSC-AIDS-301 Applied Mathematics	3	3	3	1	1	1				CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10	
											ESE	70									
2	PCC-AIDS-302 Computer Networks	3	3	3				1	2	2	CIE	30	100	40		50	20		25	10	
											ESE	70									
3	PCC-AIDS-303 Discrete Mathematics &Structures	3	3	3	1	1	1				CIE	30	100	40					25	10	
											ESE	70									
4	PCC-AIDS-304 Data Visualization	3	3	3				1	2	2	CIE	30	100	40		25	10		25	10	
											ESE	70									
5	PCC-AIDS-305 Computer architecture and OS	3	3	3	1	1	1				CIE	30	100	40					25	10	
											ESE	70									
6	PCC-AIDS-306 Problem solving using programming language	2	2	2				2	4	4						50	20		50	20	
7	HM-307 EVS	2	2	2																	
	Total (Sem III)	19	19	19	3	3	3	4	8	8			500			125	50		175	70	

CIE-Continuous Internal Evaluation

ESE-End Semester Examination

SECOND YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN

Semester IV

		TEACHING SCHEME									EXAMINATION SCHEME									
Sr No	Course/Subject /Title	Theory			Tutorial			Practical			Theory				Practical			Term Work		
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	PCC-AIDS-401Data Structure using Python	3	3	3				1	2	2	CIE				AS PER BOS GUIDELINES	50	20	AS PER BOS GUIDELINES	25	10
											ESE									
2	PCC-AIDS-402Introduction to Data Science	3	3	3				1	2	2	CIE	30	100	40					25	10
											ESE	70								
3	PCC-AIDS-403Automata Theory	3	3	3	1	1	1				CIE	30	100	40					25	10
											ESE	70								
4	PCC-AIDS-404DBMS	3	3	3				1	2	2	CIE	30	100	40		50	20		25	10
											ESE	70								
5	PCC-AIDS-405Software Engineering	3	3	3	1	1					CIE	30	100	40					25	10
6	PCC-AIDS-406Web Technology	2	2	2				1	2	2	CIE	30	100	40		50	20		25	10
											ESE	70								
7	HM-407EVS	2	2	2							CIE	30	100	40						
											ESE	70								
	Total (Sem IV)	19	19	19	2	2	2	4	8	8			600			150	60		150	60

THIRD YEAR COMPUTER SCIENCE AND ENGINEERING(AIDS) - CBCS PATTERN

Semester V

Sr No	Course/Subject /Title	TEACHING SCHEME									EXAMINATION SCHEME										
		Theory			Tutorial			Practical			Theory				Practical			Term Work			
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN	
1	PCC-AIDS-501 Introduction to AI	4	4	4				1	2	2	CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10	
											ESE	70									
2	PCC-AIDS-502 Design and Analysis of Algorithms	4	4	4	1	1	1				CIE	30	100	40					25	10	
3	PCC-AIDS-503 IoT	3	3	3				1	2	2	CIE	30	100	40					25	10	
											ESE	70									
4	PCC-AIDS-504 OEC(Computer Graphics and Multimedia)	3	3	3							CIE	30	100	40					25	10	
											ESE	70									
5	PCC-AIDS-505 Python Libraries for Data Science	4	4	4				1	2	2	CIE	30	100	40		50	20		25	10	
6	PW-AIDS-506 Mini Project							1	2	2						50	20		25	10	
7	HM-AIDS-507 Business Communication				1	2	2									50	20		25	10	
	Total (Sem III)	18	18	2	3	3	4	8	8	0			500			150	60		175	70	

THIRD YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN

Semester VI

		TEACHING SCHEME									EXAMINATION SCHEME									
Sr No	**Course/Subject /Title**	Theory			Tutorial			Practical			Theory				Practical			Term Work		
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	PCC-AIDS-601 Machine Learning	3	3	3	1	1	1				CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10
											ESE	70								
2	PCC-AIDS-602Image Processing	3	3	3				1	2	2	CIE	30	100	40					25	10
											ESE	70								
3	PCC-AIDS-603Big Data Technology	3	3	3				1	2	2	CIE	30	100	40		50	20		25	10
											ESE	70								
4	OEC-AIDS-604 (E-Commerce and Digital Marketing)	3	3	3							CIE	30	100	40						
											ESE	70								
5	PCC-AIDS-605High Performance Computing	3	3	3	1	1	1					30	100	40					25	10
												70								
6	PCC-AIDS-606MVC Frameworks	3	3	3				1	2	2						50	20		25	10
7	PW-607 Mini Project							1	2	2						50	20		25	10
	Total (Sem IV)	18	18	18	2	2	2	4	8	8			500			150	60		150	60

BTECH COMPUTER SCIENCE AND ENGINEERING(AIDS) - CBCS PATTERN

Semester VII

		TEACHING SCHEME									EXAMINATION SCHEME									
Sr No	**Course/Subject /Title**	Theory			Tutorial			Practical			Theory				Practical			Term Work		
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	PCC-AIDS-701 Deep Learning	4	4	4				1	2	2	CIE	30	100	40	AS PER BOS GUIDELINES	50	20	AS PER BOS GUIDELINES	25	10
											ESE	70								
2	PCC-AIDS-702 Natural Language Processing	3	3	3				1	2	2	CIE	30	100	40					25	10
3	PCC-AIDS-703 Business Analytics	3	3	3	1	1	1				CIE	30	100	40					25	10
											ESE	70								
4	PCC-AIDS-704 Computer Vision	3	3	3				2	4	4						50	20		50	20
5	PCE-AIDS-705 Elective 1	3	3	3	1	1	1				CIE	30	100	40					25	10
6	PW-706 Project I							2	4	4						50	20		50	20
7	SI-AIDS-707Internship							1											50	20
		16	16	16	2	2	2	7	12	12			400			150	60		250	100

Elective-1 Mobile Adhoc Network / Cyber Security / Robotics System

BTECH COMPUTER SCIENCE AND ENGINEERING(AIDS) - CBCS PATTERN

Semester VIII

Sr No	Course/Subject /Title	TEACHING SCHEME									EXAMINATION SCHEME										
		Theory			Tutorial			Practical			Theory				Practical			Term Work			
		Credits	No of	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	PCC-AIDS-801Time Series Analysis and Forecasting	4	4	4	1	1	1				CIE ESE	30 70	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10
2	PCC-AIDS-802 Cloud Computing	3	3	3				1	2	2	CIE ESE	30 70	100	40		50	20		25	10
3	PCE-AIDS-803 Elective II	3	3	3	1	1	1				CIE ESE	30 70	100	40					25	10
4	PCE-AIDS-804 Elective III	3	3	3	1	1	1				CIE ESE	30 70	100	40					25	10
5	PCC-AIDS-805 MLOps	3	3	3				2	4	4						50	20		50	20
6	PW-AIDS-806 Project 2							2	4	4						50	20		50	20
7	HM-AIDS-807 Professional Skills				1	1	1												50	20
		16	16	16	4	4	4	5	10	10			400			150	60		250	100

Elective-II - Project Management / Software Testing / Digital Marketing

Elective-III - AI in Healthcare / AI in Agriculture / Industry 4.0

SECOND YEAR COMPUTER SCIENCE AND ENGINEERING(AIDS) – CBCS PATTERN																				
Semester III																				
		TEACHING SCHEME									**EXAMINATION SCHEME**									
Sr No	**Course/Subject /Title**	Theory			Tutorial			Practical			Theory				Practical			Term Work		
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	BSC-AIDS-301 Applied Mathematics	3	3	3	1	1	1				CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10
											ESE	70								
2	PCC-AIDS-302 Computer Networks	3	3	3				1	2	2	CIE	30	100	40		50	20		25	10
											ESE	70								
3	PCC-AIDS-303 Discrete Mathematics &Structures	3	3	3	1	1	1				CIE	30	100	40					25	10
											ESE	70								
4	PCC-AIDS-304 Data Visualization	3	3	3				1	2	2	CIE	30	100	40		25	10		25	10
											ESE	70								
5	PCC-AIDS-305 Computer architecture and OS	3	3	3	1	1	1				CIE	30	100	40					25	10
											ESE	70								
6	PCC-AIDS-306 Problem solving using programming language	2	2	2				2	4	4						50	20		50	20
7	HM-307 EVS	2	2	2																
	Total (Sem III)	**19**	**19**	**19**	**3**	**3**	**3**	**4**	**8**	**8**			**500**			**125**	**50**		**175**	**70**

CIE- Continuous Internal Evaluation **ESE**-End Semester Examination

SECOND YEAR COMPUTER SCIENCE AND ENGINEERING – CBCS PATTERN

Semester IV

		TEACHING SCHEME									EXAMINATION SCHEME									
Sr No	Course/Subject /Title	Theory			Tutorial			Practical			Theory				Practical			Term Work		
		Credits	No of Lecture	Hours	credits	No of Hours	Hours	credits	No of Hours	Hours	mode	Marks	Total Marks	min	Hours	MAX	MIN	Hours	MAX	MIN
1	PCC-AIDS-401Data Structure using Python	3	3	3				1	2	2					AS PER BOS GUIDELINES	50	20	AS PER BOS GUIDELINES	50	20
2	PCC-AIDS-402Introduction to Data Science	3	3	3				1	2	2	CIE	30	100	40					25	10
											ESE	70								
3	PCC-AIDS-403Automata Theory	3	3	3	1	1	1				CIE	30	100	40						
											ESE	70								
4	PCC-AIDS-404DBMS	3	3	3				1	2	2	CIE	30	100	40		50	20		25	10
											ESE	70								
5	PCC-AIDS-405Software Engineering	3	3	3	1	1	1				CIE	30	100	40						
											ESE	70								
6	PCC-AIDS-406Web Technology	2	2	2				1	2	2	CIE	30	100	40		50	20		50	20
											ESE	70								
7	HM-407EVS	2	2	2							CIE	30	100	40						
											ESE	70								
	Total (Sem IV)	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**			**600**			**150**	**60**		**150**	**60**

APPLIED MATHEMATICS

TEACHING SCHEME	EXAMINATION SCHEME
Theory: 3 Hrs / Week	**ESE:** 70 **CIE:** 30
Tutorial: 1 Hrs / Week	**Term work:** 25
Practical: --	**Practical : --**

Course Objectives:

1. To develop mathematical skills and enhance thinking power of students.
2. To give the knowledge to the students of fuzzy set theory, numerical methods probability Linear algebra and statistics with an emphasis on the application of solving engineering problems
3. To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Describe the statistical data numerically by using Lines of regression and Curve fittings.
2. Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions.
3. Calculate numerical Integration.
4. Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.
5. Solve examples on vector calculus.
6. Solve assignment problems by using different techniques of operation research.

Unit No	Content	No of lectures
01	**Correlation, Regression & Curve Fitting:**	**06**
	1.1 Introduction. 1.2 Karl Pearson's Coefficient of Correlation. 1.3 Lines of regression of bivariate data. 1.4 Fitting of Curves by method of Least-squares: 1.4.1 Fitting of Straight lines. 1.4.2 Fitting of exponential curves. 1.4.3 Fitting of second-degree Parabolic curves.	
02	**Probability Distribution:**	**06**
	2.1 Random variables. 2.2 Discrete Probability distribution. 2.3 Continuous probability distribution. 2.4 Binomial Distribution. 2.5 Poisson Distribution. 2.6 Normal Distribution.	

03 Numerical Integration: **06**

3.1 Newton Cotes formulae.
3.2 Trapezoidal Rule.
3.3 Simpson's 1/3 rd rule.
3.4 Simpson's 3/8 th rule.
3.5 Weddle's Rule.

04 Introduction to Fuzzy sets: **06**

4.1 Crisp set and Fuzzy set.
4.2. Basic concepts of fuzzy sets.
4.3 Basic operations on fuzzy sets.
4.4 Properties of fuzzy sets.
4.5 Fuzzy Cardinality
4.6 Height of a fuzzy set, Normal and Subnormal fuzzy set

05 Vector Calculus: **04**

5.1 1Introduction, Vectors in R_n.
5.2 Vector Addition and Scalar Multiplication, Dot (Inner) Product, Located Vectors.
5.3 Hyper planes, Lines, Curves in R_n, Vectors in R_3 (Spatial Vectors).
5.4 ijk Notation, Complex Numbers, Vectors in C_n.

06 Assignment Problem: **06**

6.1 Definition, Balanced and Unbalanced assignment problem.
6.2 Hungarian Method.
6.3 Balanced assignment problems.
6.4 Unbalanced assignment problems.

Reference Books:

1. Linear Algebra, Seymour Lipschutz, Schaums outlines, 4th Edition, McGraw-Hill Publication.
2. Introduction to Linear Algebra, Gilbert Strang, 5th Edition, Wellesley-Cambridge Press.
3. Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi).
4. Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication).
5. Fuzzy Sets and Fuzzy Logic: Theory and Applications, by George J. Klir and Bo Yuan (Prentice Hall of India Private Limited).

General Instructions:

1. For the term work of 25 marks, batch wise tutorials are to be conducted.
2. The number of students per batch per tutorial should be as per university rules. Number of tutorials should be at least six (All units should be covered).

COMPUTER NETWORK

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs / Week	**ESE:** 70 **CIE:** 30
Tutorial : --	**Term work:** 25 marks
Practical: 2 Hrs. /Week	**Practical :** 50 Marks
Practical: 2 Hrs. /Week	**Practical :** 50 Marks

Prerequisite: Basic understanding of Computers

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Implement network and data link layer.
2. To implement the client server model using sockets.
3. To analyze the protocol structure using network analyzing tools.
4. Apply the concepts of application layer services.
5. Understand multimedia streaming and relevant protocols.

Unit No	Content	No of lectures
01	**Introduction to Computer Network** Overview of OSI layer Model and TCP/IP protocol model, Addressing, Underlying technologies for LANs, WANs, and Switched WANs	**06**
02	**Data Link Layer and Medium Access Control Sub layer** Design issues for Data Link Layers, Framing methods, Error control: detection and correction, Flow control, Elementary Data Link protocols, Static and Dynamic channel allocation, Multiple Access protocols, Ethernet: IEEE 802.3, IEEE 802.4, IEEE 802.5, 802.11	**06**
03	**Network Layer and Internet Protocol** IPv4 Addresses, Sub-netting and Super netting, Class less Addressing, Delivery, Forwarding and routing; Routing methods, Congestion control algorithms: Principles, Congestion prevention policies, Load Shedding, Jitter Control, Datagram format, Fragmentation and reassembly models, ARP, RARP, ICMP, IGMP	**06**
04	**Transport Layer** UDP: Process to Process communication, User Datagram Format, Operation and uses of UDP. TCP: TCP Services and Features, TCP segment format, TCP Connections, Flow and error control in TCP, TCP Timers; Berkeley Sockets: Socket Addresses, Elementary Socket system calls byte ordering and address conversion routines, connectionless iterative server, connection oriented concurrent server, TCP and UDP Client server Programs.	**06**

05 Application layer: DNS, FTP, Telnet **06**

Domain Name Space, Distribution of name space, Resolution, DNS massages, BOOTP, DHCP Telnet Concept, NVT, Embedding, Options & options/sub-option negotiation, controlling the server, Out-of-band signaling, Escape charter, Mode of operation, user interface. FTP: Connections, Communication, Command processing, File transfer, User interface, Anonymous FTP, TFTP

06 Web application and Multimedia Services **06**

HTTP: Architecture, Web Documents, HTTP Transaction, Request and Response, HTTP Headers and Examples Electronic Mail: SMTP commands and responses, Mail transfer phases, MIME, POP3
Multimedia In Internet:
Streaming stored audio/video, Streaming live audio/video, Real time interactive audio/video.

TEXT BOOKS:

1. TCP/IP protocol suit 4thEd. – Behrouz A. Forouzen (Tata Mag.Hill)
2. Computer Networks – Andrew S. Tanenbaum (PHI)
3. Unix Network Programming – W. Richard Stevens (PHI)

REFERENCE BOOKS:

1. TCP/IP Illustrated, The Protocols, Vol. I – W. Richard Stevens, G. Gabrani (PearsonEducation.)
2. Internetworking with TCP/IP, Vol. I Principles, Protocols, and Architectures – D. E. Comer(PearsonEd.)
3. Internetworking with TCP/IP, Vol. III, Client-Server Programming and Application (2nd Ed.) –D.E. Comer, David L. Stevens (Pearson Ed.)

TERM WORK

1. Study, design and configuration of IEEE 802.3 Ethernet and IEEE 802.11Wireless LANs (ReferringRFCs)
2. Study of following connectivity test tools with all its options– ipconfig, arp route, traceroute nmap, netstat, finger.
3. Implementing Framing methods
4. Implementation of Error detection code CRC and Hamming code
5. Programs to understand IP addressing, classful & classless addressing
6. Implement shortest path routing algorithm.
7. Client program using UDP to connect to well-known services (echo, time of the day service etc.).
8. Implementing concurrent TCP multi service client/server.
9. Study of network protocol analyzer (Ethereal or Wire-Shark) and understanding packet formats for UDP, TCP, ARP, ICMP protocols.
10. Study of following DNS Tools with all its options. nslookup, dig, host, whois.
11. Configuration of basic services for FTP, HTTP, Telnet etc. on Linux Platform.
12. Write program to send a mail using SMTP commands and receive a mail using POP3commands.

DISCRETE MATHEMATICS STRUCTURE

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**ESE:** 70 **CIE**: 30
Tutorial : 1 Hrs/Week	**Term work:** 25 marks
Practical: ---	**Practical :---**

Prerequisite: Basic Mathematics

Course Objectives:

1. To expose the students to the mathematical logic related to computer science areas.
2. To enhance the problem-solving skills in the areas of theoretical computer science.
3. To use mathematical concepts in the development of computer applications.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Apply logic concepts in designing program.
2. Illustrate basic set concepts & apply operations onset.
3. Minimize the Boolean Function.
4. Apply basic concepts of probability to solve real world problem.
5. Represent data structures using graph concepts.
6. Design abstract machine, detect deadlocks.

Unit No	Content	No of lectures
01	**Mathematical Logic:** Statements & Notations, Connectives, Statement Formulas & truth table, Well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological Implications, functionally complete set of connectives, other connectives, Normal Forms, Theory of Inference for statement calculus.	10
02	**Set Theory:** Basic concepts of set theory, Operations on Sets, Ordered pairs & n-tuples, Cartesian product	04
03	**Relations & Functions:** Relations. Properties of binary relations. Matrix & Graph Representation of Relation., Partition & covering of Set, Equivalence Relations. Composition of Binary Relation., POSET & Hasse Diagram, Functions, Types of Functions, Composition of functions.	06

04 Algebraic Systems: **06**

Algebraic Systems: Examples & general Properties, Semi groups & Monoids, Groups: Definitions & Examples, Subgroup & Homomorphism.

05 Lattice and Boolean Algebra: **08**

Lattice as partially ordered sets, Lattice as Algebraic Systems., Special Lattices., Boolean Algebra: Definitions & examples, Boolean Functions., Representation & Minimization of Boolean Functions.

06 Graph Theory: **05**

Basic concepts of graph theory., Paths, Reachability & Connectedness, Matrix, Representations of Graphs., Storage Representation & Manipulations of Graphs. PERT & Related technologies.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applicationto Computer Science" byJ.P.Tremblay & R. Manohar (MGH International)

REFERENCE BOOKS:

1. Discrete Mathematics –SemyourLipschutz, Marc Lipson (MGH), Schaum's outlines.
2. Discrete Mathematics and its Applications – Kenneth H. Rosen (AT&T Bell Labs)(mhhe.com/rosen)
3. Discrete Mathematical Structures – Bernard Kolman, Robert Busby, S. C. Ross and Nadeemur-Rehman (PearsonEducation)

DATA VISUALIZATION

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**ESE:** 70 **CIE**: 30
Tutorial : --	**Term work:** 25
Practical: 2 Hr / Week	**Practical :** 25

Unit No	Content	No of lectures
01	**Introduction to Data Visualization** Brief history of data visualization, scientific design choices in data visualization- choice of graphical form, grammar of graphical techniques of large amount of data, crucial need of visualization techniques, challenges in visualization techniques, classification of visualization techniques for qualitative and quantitative data, power of visualization techniques, introduction to different visualization techniques.	**06**
02	**Static Graphical Techniques** Introduction to bar graph, basic understanding of making basic bar graph, grouping bars together, bar graphs on counts, customization of bar graphs by changing application of bar graph in business.	**06**
03	**Multivariate Graphical Techniques** Introduction to correlation matrix, application of correlation matrix in the multivariate analysis, network graph, basics of heat map, difference between heat map and tree map, introduction to higher dimensional scatter plot, axis adjustment in the higher dimensional scatter plot, addition of prediction surface of higher dimensional scatter plot.	**04**
04	**Graphical Validation** Basics of multivariate statistical visual representations and its results, dendrogram, importance of dendrogram in grouping (cluster analysis), Scree Plot, importance of Scree Plot, application of Scree Plot in determining number of clusters and factors, QQ plot, importance of QQ plot in distribution of data for the further quantitative analysis, PP plot, applications and usage of PP Plot for distribution detection.	**06**

05 Customization - I **06**

Introduction to annotations – adding: text, mathematical expression, lines, arrows, shaded shapes, highlighting the texts and items, adding error bars, introduction to axis, swapping x and y axis, changing the scaling ration in the axis, positioning of axis and arranging tick marks and labels, color, size, title, axis units, changing width and spacing of the bar chart, adding labels to bar graph.

06 Customization - II **06**

Changing the appearance of axis labels, circular graphs, using themes, changing the appearance of theme elements, creating the own themes, legends: removing the legends, position of legends, legend title, labels in legends.

TEXT BOOKS:

1. Data Visualization: Principles & Practices, Alexandru Telea, 2nd Ed, CRC Press
2. Hand Book of Data Visualization, Chun-houh Chen, Wolfgang Härdle, Antony Unwin, Springer Publication

REFERENCE BOOKS:

1. R Graphics Cook Book Winston Chang First Edition, O'Reilly Publication
2. ggplot2 Elegant Graphics for Data Analysis by Hadley Wickham Springer Publication

COMPUTER ARCHITECTURE & OPERATING SYSTEM

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs / Week	**ESE : 70** **CIE**: 30
Tutorial : --- 1 Hr / Week	**Term work:** 25
Practical: --	**Practical :** --

Pre-Requisites: None

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity andknowledge of appropriate solution techniques related to:

1. To understand the structure, function and characteristics of computer systems
2. To identify the elements of modern instructions sets and their impact on processor design
3. To understand the services provided by and the design of an operating system.
4. Understand the structure, organization memory management.

Course Outcomes:

On completion of the course, students will be able to:

1. Understand the theory and architecture of central processing unit & Analyze some of the design issuesin terms of speed, technology, cost, performance
2. Use appropriate tools to design verify and test the CPU architecture & Learn the concepts of parallelprocessing, pipelining and inter processor communication.
3. Understand the architecture and functionality of central processing unit & Exemplify in a better waythe I/O and memory organization, Memory management systems, Virtual Memory
4. Describe and explain the fundamental components of a computer operating system
5. Define, restate, discuss, and explain the policies for scheduling, deadlocks, memory management,synchronization, system calls, and file systems.

Unit No	Content	No of lectures
01	**Introduction, Arithmetic and Instruction Sets**	**06**

Introduction: Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function.

Computer Arithmetic: The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

Instruction Sets: Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

02 Memory Organization and Management 08

Memory Organization: Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems. External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Continuous Memory Allocation, Fixed and variable partition, Internal and external fragmentation and compaction, Paging: Principle of operation, Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

03 Control Unit & Input/ Output Organization 06

Control Unit: Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming.

Input/ Output Organization: External devices, I/O module, Programmed I/O, Interrupt driven I/ O, Direct memory access, I/O channels and processors, External interface. Instruction pipe-lining: Concepts. Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol

04 Introduction OS & Processes and CPU Scheduling: 06

Introduction and Operating system structures: Definition, Types of Operating system, Real Time operating system, System Components- System Services, Systems Calls, System Programs, System structure. Virtual Machines, System Design and Implementation, System Generations.

05 Processes and CPU Scheduling 06

Processes and CPU Scheduling: Process Concept, Process Scheduling, Operation on process, Cooperating processes. Threads, Inter-process Communication, Scheduling criteria, scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Scheduling Algorithms and performance evaluation.

06 Process Synchronization & Deadlocks 04

Process Synchronization: The critical-section problem, Critical regions, Synchronization Hardware, Semaphores, Classical Problems of synchronization, and Monitors Synchronizations in Solaris.

Deadlocks: Systems Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined approach to deadlock Handling.

TEXT BOOKS:

1. William Stalling, Computer Organization and Architecture: Designing for Performance, Prentice Hall Publication, 8th Edition, 2009.
2. Hayes, Computer Architecture and Organization, McGraw-Hill Publication, 3rd Edition, 2012.
3. Zaky, Computer Organization, McGraw-Hill Publication, 5th Edition, 2011
4. Andrew S. Tanenbaum, Modern Operating System, PHI Publication, 4th Edition, 2015.

REFERENCE BOOKS:

1. Hennessy and Patterson, Computer Architecture: A Quantitative Approach, Morgan and KaufmanPublication, 4th Edition, 2007.
2. Morris Mano, Computer System Architecture, Pearson Education India, 3rd Edition, 2007.
3. Mostafa Abd-El-Barr, Hesham El-Rewini, Fundamentals of Computer Organization and Architecture,Wiley Publication, 1st Edition, 2004.

PROBLEM SOLVING USING PROGRAMMING LANGUAGES

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs. / Week	**Theory :---**
Tutorial : ---	**Term work:** 50
Practical: 4 Hrs. / Week	**Practical :** 50

Prerequisite: Digital Electronics, Computer Fundamentals

Course Objectives:

1. To learn concepts of arrays and pointers in C
2. To learn file handling in C
3. To learn memory management in C
4. To learn structures in C

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Articulate the principles of procedure-oriented problem solving and programming.
2. Explain programming fundamentals including statements, control flow and recursion
3. Able to formulate problems and implement algorithmic . .
4. Analyze and use data structures to solve the complex problem statements. .
5. Demonstrate file operations using file handling concepts through developing applications.

Unit No	Content	No of lectures
01	**Introduction to C:** The Form of a C Program, The Library and Linking, Separate Compilation, Compiling Program, C's Memory Map; Expressions – The Basic Data Types, Modifying the Basic Types, Identifies Names, Variables, The Four C Scopes, Type Qualifiers-const, volatile, Storage Class Specifiers; Statements - Selection Statements, Iteration, Statements, Jump Statements, Expression Statements, Block Statements.	04
02	**Console I/O & Basics of Array and Strings** Console I/O: Reading and Writing Characters, Reading and Writing Strings, Formatted Console I/O, printf(), scanf(), Suppressing Input. Arrays and Strings- Two-Dimensional Arrays, Arrays of Strings, Multidimensional Arrays, Array Initialization, Variable- Length Arrays.	04
03	**Functions:** The General Form of a Function, Understanding the Scope of a Function, Parameter passing, Passing arrays to functions, Function Arguments, argc	04

and argv-Arguments to main (), The return Statement, What Does main() Return?, Recursion, Function Prototypes, Declaring Variable Length Parameter Lists, The inline Keyword

04 Pointers: **04**

What Are Pointers? Pointer Variables, The Pointer 0perators, Pointer Expressions, Pointers and Arrays, Arrays of Pointers, Multiple Indirection, Initializing Pointers, Pointers to Functions and structures, C's Dynamic Allocation Functions, restrict-Qualified Pointers, Problems with Pointers.

05 Introduction to Python **04**

Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, Introduction to anaconda, python variable declaration, Keywords, Indents in Python, Python input/output operations

06 Python's Operators & Built in Types **04**

Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator Precedence, Python's Built-in Data types String, List, Tuple, Set, Dictionary (characteristics and methods)

TEXT BOOKS:

1. C the Complete Reference by Herbert Schild (Tata McGraw Hill) 4thEdition.
2. The C Programming Language- Brian W. Kernighan, Dennis Ritchie 2ndEdition.
3. Mark Lutz, "Learning Python", 5th edition, Orelly Publication,
4. Michel Dawson, "Python Programming for Absolute Beginers" ,

REFERENCE BOOKS:

1.Programming in ANSI C by E.Balaguruswamy.(TataMcGraw Hill) 4th Edition.
2. David Beazley, Brian Jones., "Python Cookbook", Third Edition, Orelly Publication

ENVIORMENT STUDIES (For Sem III & IV)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs/Week	ESE (For 4th Sem) – 70marks
Tutorial :--	(For 4th Sem) Environmental Project Report 30 marks

Unit No	Content	No of lectures
01	**Nature of Environmental Studies:** Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness. Concept of sustainability. Sustainable development and it's goals with Indian context.	**03**
02	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids, Introduction, types, characteristics features, structure and function of the following ecosystem: Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Degradation of the ecosystems and it's impacts.	**09**
03	**Natural Resources and Associated Problems** **Forest resources**: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. **Water resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. **Mineral resources**: Usage and exploitation. Environmental effects of extracting and using mineral resources. **Food resources**: World food problem, changes caused by agriculture, effect of modern agriculture, fertilizer-pesticide problems. **Energy resources**: Growing energy needs, renewable and non- renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, nuclear energy,	**08**

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Consumerism, ecological foot prints, carbon foot prints, carbon credits.

Role of an individuals in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

04 Biodiversity and its Conservation **08**

Introduction- Definition: genetic, species and ecosystem diversity.

Bio-geographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega- diversity nation, Western Ghat as a biodiversity region, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts, Endangered and endemic species of India,

Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity. Convention on Biological Diversity.

05 Environmental Pollution: **08**

Definition: Causes, effects and control measures of:

Air pollution, Water pollution, Soil pollution, Marine pollution Noise pollution

Thermal pollution, nuclear hazards, Global Level Environmental Problems like Global warming, acid rain, ozone layer depletion, Nuclear accidents and holocaust.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Solid waste management control rules, Role of an individual in prevention of pollution.

06 Social Issues and the Environment **04**

Human population growth, impact on environment.Human Health and welfare, Environmental ethics: Role of Indian religious traditions and culture in conservation of the environment.

Environmental movements- Chipko Movement, Appiko Movement, Silent Valley. Resettlement and rehabilitation of people; its problems and concerns.

Water conservation, rain water harvesting, watershed management. Water conservation by Dr.Rajendra Singh, Anna Hazare etc.

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Wasteland reclamation, Environmental communication and public awareness, case studies.

07 Environmental Protection- Policies and practices **05**

Air (Prevention and Control of Pollution)
Act.1981

Water (Prevention and control of Pollution)
Act - 1974

Wildlife Protection Act-1972

Forest Conservation Act-1980

National and International conventions and agreements on environment

08 Field Work (Environmental Project Report) **10**

Visit to a local area to document environmental assets-River/forest/grassland/hill/mountain, or Visit to a local polluted ite/Industry, or Urban/Rural/Industrial/Agricultural or Study of common plants, insects, birds.or Study of simple ecosystems - ponds, river, hill slopes, etc. (Field work is equal to 10 lecture hours)

REFERENCE

Agarwal, K.C.2001, Environmental Biology, Nidi Pubi. Ltd., Bikaner.

Bharucha Erach, The Biodiversity of India, Mapin Publishing pvt. Ltd.,Ahmedabad380013, India, Email:mapin@icenet.net (R)

Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc., 480p

Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)

Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001,

Environmental Encyclopedia, Jaico Publ. Hpise, Mumbai, 1196p

De A.K., Environmental Chemistry, Wiley Western Ltd.

Down to Earth , Cebtre fir Scuebce and Environment (R)

Gleick, H.,1993, Water in crisis, Pacific Institute for studies in Dev. Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473p

Hawkins R.e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)

Heywood, V.H.& Watson, R.T.1995, Global Biodiversity Assessment,Cambridge Univ. Press 1140p.

Jadhav, H.& Bhosale, V.M.1995, Environmental Protection and Laws, Himalaya Pub. Hcuse, Delhi 284p.

Mickinney, M.L.& School. R.M.1196, Environmental Science Systems & Solutions, Web enhanced edition, 639p.

Mhaskar A.K., Mastter Hazardous, Techno-Science Publications (TB)

Miller T.G.Jr., Environmental Science. Wadsworth Publications Co. (TB)

Odum, E.P.1971, Fundamentals of Ecology, W.B.Saunders Co. USA, 574p.

Rao M.N.& Datta, A.K.1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p

Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut

Survey of the Environment, The Hindu (M)

Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)

Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I anfd II, Environmental Media (R)

Trivedi R.K. and P.K. Gokel, Intriduction to air pollution, Tecgbi-Science Publications (TB)

SEMESTER - IV

DATA STRUCTURES USING PYTHON

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs / Week	**ESE : - --** **CIE**: ---
Tutorial :	**Term work:** 50
Practical: -- 2 Hr / Week	**Practical :** 50

Prerequisite: Fundamentals of programming

Course Objectives:

After completion of the course, students will have adequate background, conceptual clarity and knowledge of appropriate solution techniques related to:

1. Introduce the fundamental concept of Python programming to the students
2. Understand various data structures in Python and write algorithms and programs using them
3. Compare alternative implementations of data structures with respect to performance
4. Discuss the computational efficiency of the principal algorithms for sorting, searching, andhashing

Course Outcomes:

On completion of the course, students will be able to:

1 Write programs using basic concepts of Python Programming

2 Implement algorithms for arrays, linked structures, stacks, queues, trees, and graphs

3 Write programs that use arrays, linked structures, stacks, queues, trees, and graphs

4 Compare and contrast the benefits of dynamic and static data structures implementation

5 Discuss the computational efficiency of the principal algorithms for sorting, searching,
and hashing

Unit No	Content	No of lectures
01	**Introduction to Programming**	**07**

Introduction to Programming, Why Programming, what is a Program? Problem Solving, Algorithms and Data Structure Introduction to Programming, Variables, Data Types, Input-Output Statements, Indentation, Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators,

Membership Operators, Identity Operators, Expressions and order of evaluations. Control Flow- if, if-elif-else, for, while break, continue, pass Collections- String, Lists, Tuples, Dictionaries, Sets, Map

02 Functions & Object-Oriented Programming using Python 07

Functions- Built-in and User defined functions, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables, Recursions

Need for OOP, Classes and Objects, OOP Concepts, Constructor, Class Diagram, Encapsulation, Statics, Relationship, Inheritance, and Abstract Classes, Exception Handling

03 Data Structures in Python 07

ADT- Defining the ADT, Using the ADT, Pre conditions and post conditions

Introduction to Data Structures, Types of Data Structures, Arrays- Need for array, Array ADT, Implementing array, 2-D arrays, Linked Structures- Singly Linked List & Operations with algorithms, Application- Polynomials, Doubly Linked Lists, Circular Linked List

Stacks- Stack ADT, Implementing the stack- using Python List and using a linked list, Stack Applications- Evaluating Postfix expressions

Queues- Queue ADT, Implementing the queue- using Python List and using a linked list, Priority Queue, Applications of Queues

04 Non-Linear Data Structures in Python 06

Binary Trees- Tree Structure, Properties, Implementation, Tree Traversals, Heaps-Definition, Implementation, Heap Sort

Binary Search Trees- Operations and Algorithms (searching, insertion, deletion, min, max), AVL Tree-Insertions, deletions, implementation

Hash Tables- Hashing techniques, Hash functions, Applications

05 Searching & Sorting Algorithms and Analysis 05

Search Algorithms- Linear Search Algorithm, Binary Search Algorithm,

Comparison Sort Algorithms- Introduction, Selection Sort, Insertion Sort, Bubble Sort, Merge Sort, Quick Sort

06	**Algorithmic Techniques**	**04**

Algorithm Technique- Greedy Approach, Dynamic Programming, Complexity Analysis of Algorithms- Introduction, Analysis of Algorithms, Big-O Notation, Evaluating the Python List.

TEXT BOOKS:

1. Data Structures and Algorithms Using Python, Rance D. Necaise
2. Python for Everybody, Exploring Data Using Python 3, Dr. Charles R. Severance
3. Data Structures and Algorithms in Python, Michael T. Goodrich, Roberto Tamassia, Michael

H. Goldwasser.

INTRODUCTION TO DATA SCIENCE

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs / Week	**ESE : -** 70 CIE: - 30
Tutorial :	**Term work:** 25 marks
Practical: -- 2 Hr / Week	**Practical :** --

Unit No	Content	No of lectures
01	**What is data science?** Introduction to Data Science, the data science Venn diagram, Terminology, Data science case studies, Summary, Types of Data, Flavors of Data: Structured versus unstructured data, Quantitative and qualitative data, The four levels of data: Nominal level, Ordinal level, Interval level, and Ratio level	**04**
02	**The Five Steps of Data Science:** Overview of the five steps, Explore the data, obtain the data, model the data, communicate and visualize the results.	**04**
03	**Concept of Data Science** Traits of Big data, Web Scraping, Analysis vs Reporting, Introduction to Programming, Tools for Data Science, Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK	**05**
04	**Machine Learning** Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforcement learning	**05**
05	**Visualizing Data: Bar Charts, Line Charts, Scatterplots** Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling	**06**
06	**Case Studies of Data Science:** Applications: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis	**05**

TEXT BOOKS:

1. Joel Grus, "Data Science from Scratch: First Principles with Python", O'Reilly Media

2. Aurélien Géron, "Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems", 1st Edition, O'Reilly Media

3. Jain V.K., “Data Sciences”, Khanna Publishing House, Delhi

Reference Books:

1.Jain V.K., “Big Data and Hadoop”, Khanna Publishing House, Delhi.
2. Jeeva Jose, “Machine Learning”, Khanna Publishing House, Delhi.
3. Chopra Rajiv, “Machine Learning”, Khanna Publishing House, Delhi.
4.Ian Goodfellow, Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press
5. Jiawei Han and Jian Pei, "Data Mining Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers

AUTOMATA THEORY

TEACHING SCHEME	EXAMINATION SCHEME
Theory: 3 Hrs/Week	**ESE**: 70 **CIE:** 30
Tutorial: 1 Hr / Week	**Term work:** ---
Practical: ---	**Practical : ---**

Prerequisite: Basic Mathematical Concepts, Sets, graphs.

Course Objectives:

1. To introduce students to the mathematical foundations of computation, the theory of formal languages and grammars
2. To strengthen the students' ability to understand and conduct mathematical proofs for computations
3. To make the students understand the use of automata theory in Compliers & System Programming.
4. To analyze and design finite automata, pushdown automata, grammars & Turing machines

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Understand basic concepts of Regular Language and Regular Expressions
2. Select appropriate abstract machine to recognize a given formal language.
3. Generate complex languages by applying Union, Intersection, Complement, Concatenation and Kleene * operations on simple languages.
4. Apply parsing concepts for syntax analysis.
5. Be familiar with thinking analytically and intuitively for problem solving situations in related areas of theory in computer science.

Unit No	Content	No of lectures
01	**Regular Languages and Finite Automata** Proofs, Recursive Definitions, Regular expressions and regular languages, FiniteAutomata,unions,intersection&complementsofregularlanguages,Applications of FA	**07**
02	**Nondeterminism and Kleene's Theorem** Nondeterministic finite automata, NFA with null transition, Equivalence of FA's, Kleene's Theorem (Part I & Part II), Minimal Finite Automata	**06**
03	**Context free Grammars**	**05**

Definition, Union, Concatenation and Kleene *'s of CFLs, Derivation trees and ambiguity, Simplified forms and normal forms

04 Parsing and Push down Automata **06**

Definition of Pushdown Automata, Deterministic PDA, Equivalence of CFG's& PDA's, Top down parsing, bottom up parsing.

05 Context free languages **05**

CFL's and non CFL's, Pumping Lemma, intersections and completes of CFLs

06 Turing Machines **07**

Definition,TMaslanguageacceptors,combiningTuringMachines,Computing partial function with a TM, Multi-tape TMs, and Universal TM

TEXT BOOKS:

1. Introduction to Languages & the Theory of Computations – John C. Martin (Tata MGHEdition)
2. Discrete Mathematical Structures with applications to Computer Science – J .P. Trembley & R.Manohar (MGH)

Reference Books:

1. Introduction to Automata Theory, Languages and computation – John E. Hopcraft,Raje
2. Motwani, Jeffrey D. Ullman (PearsonEdition)
3. Introduction to theory of Computations – Michael Sipser (Thomson Books/Cole)
4. Theory of Computation –Vivek Kulkarni

DATABASE MANAGEMENT SYSTEM

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**ESE**: 70 **CIE:** 30
Tutorial : --	**Term work:** 25
Practical: 2 Hr / Week	**Practical :---**

Pre-requisites: Set Theory, Operating System, Data Structures.

Course Objectives:

1. To understand fundamental concepts and algorithms of Database Systems.
2. To gain familiarity with SQL and DBMS.
3. To learn database design techniques.

Course Outcomes:

1. Understand fundamentals of database management systems.
2. Represent logical design of database using E-R Diagram.
3. Analyze & construct good database design.
4. Apply SQL queries to design & manage the database.
5. Understand transactions, concurrency control and apply to database system.
6. Understand failures in database and appropriate recovery techniques.

Unit No	Content	No of lecture
01	**INTRODUCTION TO DATABASES**	**06**
	Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Database Users & Administrators, Structure of Relational Databases, Database Schema, Keys, Relational Query Languages	
02	**E-R MODEL AND DATABASE DESIGN**	**06**
	E-R Model: The Entity-Relationship Model, Reduction to Relational Schemas, Data Redundancies, Functional Dependencies. Canonical Cover, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	
03	**STRUCTURED QUERY LANGUAGE (SQL)**	**06**
	Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Modification of Databases, Join expression, Views.	

04 DATA STORAGE & INDEXING 06

Physical storage media, File Organization, Organization of records in File, Data Dictionary Storage, Database Buffer, Basic Concepts indexing & hashing, Ordered Indices, B+ Tree Index files, Multiple-Key Access, Static Hashing, Dynamic Hashing.

05 TRANSACTION MANAGEMENT 06

Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Lock-Based Protocols, Timestamp-Based Protocols

06 RECOVERY SYSTEM 06

Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Failure with Loss of Nonvolatile Storage.

TEXT BOOKS:

1. Database System Concepts, A. Silberschatz, H.F Korth, S. Sudarshan, 6th Edition, McGraw Hill Education. (Unit 1, 3,4,5,6)
2. Database Systems - A practical approach to Design, Implementation and Management, Thomos Connolly, Carolyn Begg

Reference Books:

1. Database Systems – Design, Implementation and Management, Rob & Coronel

Minimum 12 -14 Experiments based on the following topics.

1. Draw an E-R Diagram of any organization.
2. Reduce above mentioned E-R Diagram into tables.
3. Normalize any database from first normal form to Boyce-Codd Normal Form (BCNF).
4. Write a program of Database connectivity with any object oriented language.
5. Use DDL Queries to create, alter (add, modify, rename, drop) & drop Tables.
6. Use DML Queries to insert, delete, update & display records of the tables.
7. Create table with integrity constraints like primary key, check, not null and unique.
8. Create table with referential integrity constraints with foreign key, on delete cascade and on delete set null.
9. Display the results of set operations like union, intersections & set difference.
10. Display the results of Join Operations like cross join, self join, inner join, natural join, left outer join, right outer join and full outer join.
11. Display the records using Aggregate functions like min, max, avg, sum & count. Also use group by, having clauses.
12. Display the results using String operations.
13. Create & Update views for any created table.
14. Write java program to implement dense and sparse indexing
15. Write java program to implement B+ tree indexing.
17. Study of NoSql.

SOFTWARE ENGINEERING

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** ---
Practical: ---	**Practical :**---

Course Objectives:

1. To expose the students to basic concepts & principles of software engineering.
2. To make the student aware of the importance of SDLC in their project development work.
3. To expose the students to software testing techniques and software quality management.

Course Outcomes:

1. Comprehend systematic methodologies of SDLC(Software Development Life Cycle)
2. Discriminate competing and feasible system requirements indicating correct real world problemscope and prepare stepwise system conceptual model using stakeholder analysis and requirement validation.
3. Prepare SRS document for a project
4. Apply software design and development techniques
5. Develop a quality software project through effective team-building, planning, scheduling andrisk
6. Understand testing methods at each phase of SDLC

Unit No	Content	No of lectures
01	**The Software Problem** Cost, Schedule & Quality, Scale and Change, Software Processes: Process & Project, Component Software Processes, Software Development process Models, Project Management Process.	**06**
02	**Software Requirements Analysis & specification** Value of Good SRS, Requirement Process, Requirements Specification, Other Approaches for Analysis, Validation.	**05**
03	**Software Planning & Scheduling** Responsibilities of Software Project Manager, Project Planning, Project Scheduling, Project Staffing, People CMM, Risk Management	**06**

04	**Design**	**06**
	Design Concepts, Function Oriented Design, Object Oriented Design, Detail Design, Verification, Metrics	
05	**Coding & Testing**	**07**
	Coding & Code Review, Testing, Unit Testing, Black Box, Testing, White Box Testing, Program Analysis Tools, Integration Testing, System Testing	
06	**Software Reliability &Quality Management**	**06**
	Reliability, Software Quality, Software Quality Management System, ISO 9000, SEI capability Maturity Model, Six Sigma, Agile Software Development & Extreme Programming, Agile Project Management	

TEXT BOOKS:

1. Software Engineering: A precise Approach – Pankaj Jalote (Wiley India) (Unit1,2,4).
2. Fundamentals of Software Engineering – Rajib Mall (3rd Edition)(PHI) (Unit 5,6).
3. Software Engineering by Jan Sommerville (9th Edition) Pearson (Unit 6, 7 &6.8).
4. Software Engineering Principles & Practices by RohitKhuranaITLESL (2nd Edition) Vikas Publishing House Pvt. Ltd. (Unit3).

Reference Books:

1. Software Engineering – Concepts & Practices –Ugrasen Suman (CenageLearning)
2. Software Engineering Fundamentals –Behforooz & Hudson (Oxford: Indian Edition1st)

WEB TECHNOLOGY

TEACHING SCHEME	EXAMINATION SCHEME
Theory: 2 Hrs./Week	**Theory: --**
Tutorial: --	**Term work: 50 Marks**
Practical: 4 Hrs./Week	**POE: 50 Marks**

Pre-requisites: Object oriented Programming, Basics of HTML and CSS.

Course Objectives:

1. Introduce students with front end web designing.
2. Motivate the students to develop web applications using PHP.
3. To introduce emerging Web technology concepts and tools.
4. To learn database access technologies and state management techniques.
5. To expose students to XAMPP web services.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1. Apply knowledge of client-side scripting.
2. Develop web application using PHP.
3. Design web application using MVC and Angular JS.
4. Demonstrate use of server-side technologies.
5. Explore newer tools for web development.

Unit No	Content	No of lectures
01	**Front End Web Designing HTML** HTML Design Patterns: HTML Structure, XHTML, DOCTYPE, Header Elements, Conditional Style Sheet, Structural Block Elements, Terminal Block Elements, Multipurpose Block Elements, Inline Elements, Class and ID Attributes, HTML Whitespaces	**04**
02	**Cascading Stylesheet (CSS):** CSS Selector and Inheritance: Type, Class and ID Selector, Position and Group Selectors, Attribute Selectors, Pseudo-element Selectors, Pseudo-class Selectors, Subclass Selector, Inheritance, Visual Inheritance, and Bootstrap	**05**
03	**JavaScript Basics:** Introduction to JavaScript, Basic program of JavaScript, variables, functions, conditions, loops and repetition, Function, Arrays – DOM, Built-in Objects, Regular Expression, Exceptions, Event handling In	**04**

JavaScript, Validating HTML form data using javascript, Validation-AJAX – Jquery

04 PHP basic: 04

Embedding PHP code in Your Web Pages, commenting your Code, Outputting Data to the Browser, PHP supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, and Control Structures

05 Arrays & Functions in PHP: 03

Array: What is Array?, Creating an array, outputting an Array, Merging, slicing, splicing and Dissecting Arrays, Other useful Array, Functions. Functions: Invoking a Function, Creating a Function, Function Libraries

06 PHP Database and small app using Bootstrap and Code to generate 04

Installation Prerequisites, Using the MySqli Extension, Interacting with the Database, Executing Database Transactions

TEXT BOOKS:

1. Pro HTML5 andCSS3 Design Patterns, Michael Bowers, Dionysios Synodinos and Victor Sumner ((Unit I & II, III))
2. Beginning PHP andMySQL: From Novice to Professional, W. Jason Gilmore, (Unit IV to VI)
3. http://www.php.net

Term Work

- Minimum of 15 Experiments to be performed from the above topics.
- 25 marks for performance in practical and experiments as part of continuous evaluation
- 25 marks for Practical Test and oral to be conducted.

ENVIORMENT STUDIES (For Sem III & IV)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs/Week	ESE (For 4th Sem) – 70marks
Tutorial :--	(For 4th Sem) Environmental Project Report 30 marks

Unit No	Content	No of lectures
01	**Nature of Environmental Studies:** Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness. Concept of sustainability. Sustainable development and it's goals with Indian context.	**03**
02	**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids, Introduction, types, characteristics features, structure and function of the following ecosystem: Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d)Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Degradation of the ecosystems and it's impacts.	**09**
03	**Natural Resources and Associated Problems** **Forest resources**: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. **Water resources**: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. **Mineral resources**: Usage and exploitation. Environmental effects of extracting and using mineral resources. **Food resources**: World food problem, changes caused by agriculture, effect of modern agriculture, fertilizer-pesticide problems.	**08**

Energy resources: Growing energy needs, renewable and non- renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, nuclear energy,

Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Consumerism, ecological foot prints, carbon foot prints, carbon credits.

Role of an individuals in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

04 Biodiversity and its Conservation **08**

Introduction- Definition: genetic, species and ecosystem diversity.

Bio-geographical classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values., India as a mega- diversity nation, Western Ghat as a biodiversity region, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts, Endangered and endemic species of India,

Conservation of biodiversity: In-situ and Ex- situ conservation of biodiversity. Convention on Biological Diversity.

05 Environmental Pollution: **08**

Definition: Causes, effects and control measures of:

Air pollution, Water pollution, Soil pollution, Marine pollution Noise pollution

Thermal pollution, nuclear hazards, Global Level Environmental Problems like Global warming, acid rain, ozone layer depletion, Nuclear accidents and holocaust.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Solid waste management control rules, Role of an individual in prevention of pollution.

06 Social Issues and the Environment **04**

Human population growth, impact on environment.Human Health and welfare, Environmental ethics: Role of Indian religious traditions and culture in conservation of the environment.

Environmental movements- Chipko Movement, Appiko Movement, Silent Valley. Resettlement and rehabilitation of people; its problems and concerns.

Water conservation, rain water harvesting, watershed management. Water conservation by Dr.Rajendra Singh, Anna Hazare etc.

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Wasteland reclamation, Environmental communication and public awareness, case studies.

07 Environmental Protection- Policies and practices **05**

Air (Prevention and Control of Pollution)
Act.1981

Water (Prevention and control of Pollution)
Act - 1974

Wildlife Protection Act-1972

Forest Conservation Act-1980

National and International conventions and agreements on environment

08 Field Work (Environmental Project Report) **10**

Visit to a local area to document environmental assets-River/forest/grassland/hill/mountain, or Visit to a local polluted ite/Industry, or Urban/Rural/Industrial/Agricultural or Study of common plants, insects, birds.or Study of simple ecosystems - ponds, river, hill slopes, etc. (Field work is equal to 10 lecture hours)

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