DAYALBAGH EDUCATIONAL INSTITUTE
FACULTY OF ENGINEERING
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B.TECH. (AGRICULTURAL, CIVIL, ELECTRICAL, FOOTWEAR TECH. & MECHANICAL) 2021-22

FIRST SEMESTER

Course Number	Course Title	Credits	End Sem. Exam.	Theory/ Practical
CHM181	APPLIED CHEMISTRY	3.0	Y	T
CHM182	APPLIED CHEMISTRY LAB.	1.0	Y	P
PHM181	APPLIED PHYSICS I	3.0	Y	T
PHM182	APPLIED PHYSICS LAB.	1.0	Y	P
MEM101	GRAPHIC SCIENCE	3.0	Y	T
MEM102	ENGINEERING DRAWING I	3.0	Y	P
MEM103	MANUFACTURING PROCESSES I	3.0	Y	T
MEM104	WORKSHOP PRATICE I	1.5	Y	P
MAM181	ENGINEERING MATHEMATICS I	3.0	Y	T
RDC181	AGRICULTURAL OPERATIONS I	1.0	N	P
RDC182	SOCIAL SERVICE	1.0	N	P
GKC181	SC.METH., G.K. & CURRENT AFFAIRS I	1.0	N	T
	Total Credits	27.50		
ANCILLARY COURSE (ON A CHOSEN SUBJECT) ANYONE COURSE FROM				
BBH101/ FBM101	BUSINESS ORGANISATION	3.0	Yes	T
BOH181	ENVIRONMENTAL SCIENCES	3.0	Yes	T
CEH181	THEORY OF DESIGN	3.0	Yes	T
DBD101	BASIC STATISTICS	3.0	Yes	T
DPH181	ART APPRECIATION	3.0	Yes	P
ECH181	ESSENTIAL OF ECONOMICS	3.0	Yes	T
ENH181	ENGLISH I	3.0	Yes	T
MUH181	SANGEET KRIYATMAK I	3.0	Yes	P
OMH101	COMMUNICATION TECHNIQUE HINDI I	3.0	Yes	T
PYH181	INTRODUCTION TO PSYCHOLOGY	3.0	Yes	T

B.TECH. (AGRICULTURAL, CIVIL, ELECTRICAL, FOOTWEAR TECHNOLOGY & MECHANICAL): 2021-22

SECOND SEMESTER

COURSE CODE	COURSE TITLE	Credit	End sem. Exam	Theory/ Practical
PHM281	APPLIED PHYSICS II	3.0	Y	T
PHM282	APPLIED PHYSICS LAB.	1.0	Y	P
EEM201	COMPUTER CONCEPTS & C PROGRAMMING	3.0	Y	T
EEM202	BASIC ELECTRICAL ENGINEERING	3.0	Y	T
MEM201	ENGINEERING THERMODYNAMICS	3.0	Y	T
MEM202	ENGINEERING MECHANICS I	3.0	Y	T
MEM203	ENGINEERING DRAWING II	3.0	Y	P
MAM281	ENGINEERING MATHEMATICS II	3.0	Y	T
EGC281	INDUSTRIAL VISITS	1.0	N	P
ESC281	ENVIRONMENTAL STUDIES	2.0	N	T
GKC281	SC. METH., G.K. & CURRENT AFFAIRS II	1.0	N	T
RDC281	AGRICULTURAL OPERATIONS II	1.0	N	P
RDC282	SOCIAL SERVICE	1.0	N	P
CAC281	CO-CURRICULAR ACTIVITIES	3.0	N	P

ADDITIONAL COURSE FOR CIVIL, ELECTRICAL, MECHANICAL				
MEM204	WORKSHOP PRACTICE II	1.5	Y	P

ADDITIONAL COURSE FOR INTEGRATED B.TECH. (FOOTWEAR) B.COM.				
FCM201	ACCOUNTING FOR ENGINEERS	3.0	Yes	T
FCM202	BUSINESS STATISTICS	3.0	Yes	T
FCM203	SEMINAR & GROUP DISCUSSION	2.0	Yes	P
ADDITIONAL COURSE FOR INTEGRATED B.TECH. (FOOTWEAR) B.B.A.				
FBM201	INDUSTRIAL TRAINING & DEVELOPMENT	2.0	Yes	P
FBM202	SEMINAR & GROUP DISCUSSION	2.0	Yes	P
FBM203	BASIC MANAGEMENT	3.0	Yes	T

ANCILLARY COURSE ANY ONE TO OPTED FROM THE FOLLOWING (FOR ALL BRANCHES)				
ENH281	ENGLISH II	3	Y	T
HSH281	HOUSEHOLD MANAGEMENT	3	Y	T
MUH281	SANGEET KRIYATMAK II	3	Y	P
SYH281	SOCIOLOGY OF SCIENCE	3	Y	T
ABH281	PRINCIPLES OF ECONOMICS	3	Y	T
ACH281	FUNDAMENTALS OF ACCOUNTING	3	Y	T
BBH281	BUSINESS ORGANISATION	3	Y	T
OMH201	COMMUNICATION TECHNIQUES HINDI II	3	Y	T
ZOH281	BASICS OF NEUROSCIENCE	3	Y	T

NON-FACULTY ANCILLARY-COURSE OFFERED TO B.SC. STUDENTS

EEH291	GENERAL ELECTRICAL ENGINEERING	3	Y	T
MEH291	GENERAL MECHANICAL ENGINEERING	3	Y	T

Total credits = 35.5

B.TECH. (CIVIL): 2021-22
THIRD SEMESTER COURSE
B.TECH. (CIVIL) THIRD SEMESTER

COURSE NO.	COURSE TITLE	CREDIT	END SEM. EXAM. EXISTS	THEORY/ PRACTICAL
CEM301	BUILDING CONSTRUCTION	3.0	Yes	T
CEM302	CONCRETE&CONSTRUCTION MATERIALS LAB	1.5	Yes	P
CEM303	FLUID MECHANICS	3.0	Yes	T
CEM304	FLUID MECHANICS LAB.	1.5	Yes	P
CEM305	CONSTRUCTION MATERIALS	3.0	Yes	T
EEM303	DATA STRUCTURES	3.0	Yes	T
EEM304	C PROGRAMMING LAB.	0.5	Yes	P
MEM301	ENGINEERING MECHANICS II	3.0	Yes	T
MEM302	ENGINEERING MECHANICS LAB.	1.0	Yes	P
MAM381	ENGINEERING MATHEMATICS III	3.0	Yes	T
ENH381	ENGLISH III	3.0	Yes	T
EGC381	PRODUCT MANUFACTURING PROJECT	1.5	Yes	P
EGC382	PRACTICAL TRAINING	2.0	Yes	P
GKC381	SC.METH., G.K.& CURRENT AFFAIRS III	1.0	No	T
		30.00		

B.TECH. (CIVIL) FOURTH SEMESTER

CEM401	WATER SUPPLY ENGINEERING	3.0	Y	T
CEM402	HYDRAULICS & HYDAULIC MACHINES	3.0	Y	T
CEM403	HYDRAULIC MACHINES LAB	0.5	Y	P
CEM404	GEOMATICS I	3.0	Y	T
CEM405	GEOMATICS I LAB	1.0	Y	P
CEM406	BUILDING PLANNING & DRAWING	1.0	Y	P
CEM407	WASTE WATER ENGINEERING	3.0	Y	T
CEM408	TRANSPORTATION ENGG. I	3.0	Y	T
MEM402	MECHANICS OF SOLIDS I	3.0	Y	T
MEM403	MATERIALS TESTING LAB	1.0	Y	P
ENH481	ENGLISH IV	3.0	Y	T
EGC481	INDUSTRIAL VISITS	1.0	N	P
GKC481	SC.METH., G.K. & CURRENT AFFAIRS IV	1.0	N	T
CAC481	CO-CURRICULAR ACTIVITIES	3.0	N	P
WORK EXPERIENCE COURSE (ON A CHOSEN SUBJECT)				
CEW401	REPAIR & MAINT. OF OLD STRUCTURES	2.0	N	P
CEW402	REPAIR & MAINT. OF CONST. MACHINERY	2.0	N	P
ASW401	METALLURGICAL ANALYSIS	2.0	N	P
DPW401	COMMERCIAL ART	2.0	N	P
EEW401	RADIO & TELEVISION REPAIR	2.0	N	P
EEW402	REPAIR OF ELECTRICAL EQUIPMENT	2.0	N	P
EEW403	PRINTING TECHNIQUES	2.0	N	P
EEW404	MICRO CONTROLLERS & IOT	2.0	N	P
MEW401	AUTOMOBILE ENGINEERING	2.0	N	P
MEW402	PHOTOGRAPHY	2.0	N	P
MEW403	REFRIGERATION & AIRCONDITIONING	2.0	N	P
MEW404	FURNITURE DESIGN & MANUFACTURING	2.0	N	P
		31.5		

B.TECH. (CIVIL) FIFTH SEMESTER

CEM501	TRANSPORTATION ENGINEERING-II	3.0	Y	T
CEM502	STRUCTURAL ANALYSIS I	3.0	Y	T
CEM503	STRUCTURAL ANALYSIS I LAB.	1.0	Y	P
CEM504	GEOLOGY AND SOIL MECHANICS	3.0	Y	T
CEM505	SOIL MECHANICS LAB	1.0	Y	P
CEM506	CONCRETE TECHNOLOGY	3.0	Y	T
CEM515	TRANSPORTATION ENGINEERING LAB	1.0	Y	P
PYH581	INDUSTRIAL PSYCHOLOGY	2.0	Y	T
EGC581	DESIGN ENGG./ THEME DEVELOP. PROJECT	1.5	N	P
EGC582	PRACTICAL TRAINING	2.0	N	P
CRC581	COMPARATIVE STUDY OF RELIGIONS	2.0	N	T
GKC581	SC. METH., G.K. & CURRENT AFFAIRS II	1.0	N	T
RDC581	AGRICULTURAL ENGINEERING	2.5	Y0	T
Mainstream Civil				
CEM509	HYDROLOGY & GROUND WATER ENGG.	3.0	Y	T
CEM510	CONCRETE TECHNOLOGY LAB	1.0	Y	P
MAM582	PROBABILITY & STATISTICS	3.0	Y	T
Architectural Technology Specialization				
CEM511	BASIC PRIN. OF ARCHITECTURAL DESIGN	3.0	Y	T
CEM512	BASIC ARCHITECTURAL DESIGN LAB	1.0	Y	P
MAM582	PROBABILITY & STATISTICS	3.0	Y	T
Computer Science Specialization				
EEM513	COMPUTER ARCHITECTURE	3.0	Y	T
EEM514	ADVANCED PROGRAMMING LAB	1.0	Y	P
MAM581	DISCRETE MATHEMATICS	3.0	Y	T

Course Code	Course Title	Credits	End Sem. Yes/No	Theory/ Practical

B.TECH. (CIVIL) SIXTH SEMESTER

CEM601	DESIGN OF STEEL ELEMENTS	3.0	Y	T
CEM602	IRRIGATION ENGINEERING	3.0	Y	T
CEM603	DSGN OF REINFORCED CONCRETE STRUC.I	3.0	Y	T
CEM604	STRUCTURAL ANALYSIS II	3.0	Y	T
CEM605	FOUNDATION ENGINEERING	3.0	Y	T
CEM607	GEOMATICS II	3.0	Y	T
CEM608	GEOMATICS LAB	1.0	Y	P
EGC681	DESIGN ENGG./THEME DEVELOP. PROJECT	1.5	Y	P
RDC681	VILLAGE INDUSTRIES&ENTREPRENUERSHIP	2.0	Y	T
CEC681	CULTURAL EDUCATION	2.0	N	T
CAC681	CO-CURRICULAR ACTIVITIES	3.0	N	T
Mainstream Civil				
CEM611	COMPUTER AIDED DSGN. IN CIVIL ENGG.	3.0	Y	T
CEM612	CAD LAB	1.5	Y	P
Architectural Technology Specialisation				
CEM613	DISASTER MITIGATION & PLANNING	3.0	Y	T
CEM614	PRINCIPLES OF TOWN PLAN.& ARCH. LAB	1.5	Y	P
Computer Science Specialisation				
EEM611	DESIGN & ANALYSIS OF ALGORITHMS	3.0	Y	T
EEM612	COMPUTER SCIENCE LAB	1.5	Y	P

B.TECH. (CIVIL) SEVENTH SEMESTER (2021-22)

Core courses common to all the three streams:		**Credits**		
Code	Course Title	Credits	ES Y/N	T/P
CEM701	DSGN.OF REINFORCED CONCRETE STRU.II	3.0	Y	T
MEM708	MANAGERIAL ECO. & INDUSTRIAL ORGAN.	3.0	Y	T
CEH701	CIVIL ENGINEERING PROJECT I	3.0	N	P
CEH702	SEMINARS	1.0	N	P
EGC781	CO-OP TRAINING	4.0	Y	P
RDC781	RURAL ENGINEERING PROJECT	1.0	N	P
Optional Courses	Any **three** from the following specialization List			
PEE315	Self Study (only for 5 year integrated M.Tech.)	1.0		

Mainstream Civil & Architectural Technology Specialisation				
CEM704	BRIDGE ENGINEERING	3.0	Y	T
CEM708	SMART BUILDING/INTELLIGENT BUILDING DSGN.	3.0	Y	T
CEM709	TUNNEL AND HARBOUR DOCK ENGINEERING	3.0	Y	T
CEM710	ADVANCED BUILDING SERVICES DESIGN	3.0	Y	T
CEM711	SUSTAINABLE GREEN BLDG DSGN & ECO-VILL.	3.0	Y	T
CEM712	AUTO-CAD CIVIL	3.0	Y	P
CEM713	GIS APPLICATIONS	3.0	Y	P
CEM714	ECOTECT	3.0	Y	P
CEM715	HISTORY OF STRUCTURES	3.0	Y	P
Computer Science Specialisation				
EEM706	ELECTRO-MAGNETIC FIELD THEORY	3.0	Y	T
EEM710	SOFTWARE DESIGN	5.0	Y	T
EEM719	VLSI DESIGN TECHNIQUES	3.0	Y	T
EEM720	COMPUTER NETWORKS	3.0	Y	T
EEM722	DIGITAL IMAGE PROCESSING	3.0	Y	T

B.TECH. (CIVIL ENGINEERING) VIII SEMESTER

Code	Course Title	Credits	ES Y/N	T/P
CEM801	CONTRACTS&STATUTORY PROV.FOR BULDG.	3.0	Y	T
CEM802	CIVIL ENGINEERING PROJECT II	8.0	Y	P
CEM803	SEMINARS	1.0	Y	T
RDC881	RURAL ENGINEERING PROJECT	1.0	Y	P
CAC881	CO-CURRICULAR ACTIVITIES	3.0	N	P
#	STREAM WISE CORE COURSES	3.0	Y	T
*	STREAM WISE FIRST OPTIONAL COURSES	3.0	Y	T
**	STREAM WISE SECOND OPTIONAL COURSES	3.0	Y	T
***	STREAM WISE THIRD OPTIONAL COURSES	3.0	Y	T
PME415	*SELF STUDY COURSE (only for 5 year Integrated M.Tech.)*	4.0	Y	P

In addition to above stream-wise Core Courses:

Mainstream Civil				
CEM805	ANALYSIS& DSGN OF HYDRAULIC STRUCT.	3.0	Y	T
Architectural Technology Specialization				
CEM807	URBAN PLANNING AND INFRASTRUCTURE	3.0	Y	T
Computer Science Specialization				
EEM812	OPERATING SYSTEMS	3.0	Y	T

Stream-Wise First Optional Courses Any One Of The Following To Be Opted:

Mainstream Civil & Architectural Technology Specialization				
CEM806	MACHINE FOUNDATION DESIGN	3.0	Y	T
CEM808	GROUND IMPROVEMENT TECHNIQUES	3.0	Y	T
CEM809	RIVER ENGINEERING	3.0	Y	T
CEM811	CONSTRUCTION TECHNOLOGY& MANAGEMENT	3.0	Y	T
Computer Science Specialization				
EEM821	NEURAL NETWORKS	3.0	Y	T
EEM823	SYSTEMS OPTIMIZATION USING EAS	3.0	Y	T
EEM814	DIGITAL SIGNAL PROCESSING	3.0	Y	T
*EEM825	MOBILE COMPUTING	3.0	Y	T

Stream-Wise Second Optional Courses Any One Of The Following To Be Opted:

Mainstream Civil & Architectural Technology Specialization				
CEM810	EARTHQUAKE RESISTANT DSGN OF STRUC.	3.0	Y	T
MEM716	FINITE ELEMENT METHOD	3.0	Y	T
CEM804	ENVIRONMENTAL ENGINEERING	3.0	Y	T
Computer Science Specialization				
EEM817	MICROWAVE ENGINEERING	3.0	Y	T
EEM820	QUANTUM COMPUTING	3.0	Y	T
EEM824	FUZZY SYSTEMS	3.0	Y	T

Third Optional Courses (Common to all Streams) Any One Of The Following To Be Opted:

EEM811	ROBOTICS	3.0	Y	T
MEM809	NANO-TECHNOLOGY & NANO-COMPUTING	3.0	Y	T
MEM810	PROJECT ENGINEERING & MANAGEMENT	3.0	Y	T
MEM811	FUTUROLOGY STUDY	3.0	Y	T
MEM812	NON-CONVENTIONAL ENERGY ENGINEERING	3.0	Y	T
MEM813	INTEGRATED SUPPLY CHAIN MANAGEMENT	3.0	Y	T
CEM812	WATER CONSERVATION & REUSE	3.0	Y	T
CEM813	INTELLIGENT SERVICES	3.0	Y	T

Course Number: CHM181, Course Title: APPLIED CHEMISTRY
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39

UNIT 1: WATER
Introduction. Sources of natural water. Impurities in natural water. Effect of impurities present in natural water for domestic and industrial purposes. Treatment of boiler feed water -
(a) Internal treatment, (b) External treatment, problems. Lime soda process, Zeolite process. Analysis of water.
UNIT 2: FUELS-FUELS AND THEIR CLASSIFICATION
SOLID FUELS: Coal, different kinds, formation & origin of coal. Different theories. Analysis of coal. Determination of calorific values. Pulverised coal, coke and its manufacture.
LIQUID FUELS: Petroleum. Origin. Refining of petroleum. Cracking. Synthesis of petrol. Gasoline. Knocking. Octane number, Diesel fuel knocking and cetene number.
GASEOUS FUEL: Natural Gas, producer gas. Water gas. Comparison of solid, liquid and gaseous fuels.
COMBUSTION: Combustion, Calculation of air required for combustion of fuel. Combustion by weight & volume. Fuel gas analysis. Orsat apparatus. Problems on combustion.
UNIT 3: LUBRICANTS
Lubrication of different types. Types of lubricants. Tests for lubricants. Additives for lubricants. Synthetic lubricants. Selection of lubricants.
PLASTICS AND RUBBER: Plastic as engineering materials. Different types of plastic. Thermoplastic and thermosetting plastic. Natural and artificial rubber. Vulcanisation. Adhesive and their types.
REFRACTORIES: Refractories, different types, properties and uses.
UNIT 4: INTRODUCTION TO METALLURGY
General principle of ore dressing. Preliminary methods in the extraction of metals.
NON-FERROUS METALLURGY: Metallurgy of copper, Aluminium, lead and tin. Their alloys and their uses.
UNIT 5: FERROUS METALLURGY
Manufacture of pig iron, manufacture of cast iron. Types of cast iron. Manufacture of wrought iron, Manufacture of steel. Different methods. Impurities and their effects on properties of steel. S.G. iron.

SUGGESTED READINGS:
Agarwal CV: CHEMISTRY OF ENGINEERING MATERIALS
Jain & Jain: ENGINEERING CHEMISTRY
Swarup D: ELEMENTS OF METALLURGY

Course Number: CHM182, Course Title: APPLIED CHEMISTRY LAB.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:1+S:1), Min.pds./sem.: 26

List of Experiments
1. To determine the temporary hardness of water by E.D.T.A. method.
2. To estimate the Alkalinity and Chloride content of water.
3. To determine different Alkalinity present in a given solution/water sample.
4. To determine the strength of the given unknown copper sulphate solution iodometrically.
5. To determine the ester content of the given oil.
6. To determine the Flash and Fire points of the given lubricating oil.
7. To determine the variation of viscosity with temperature of the given oil by plotting a graph between viscosity and temperature.
8. To determine the degree of temporary hardness of given sample of water.

Course Number: PHM181, Course Title: APPLIED PHYSICS I

Class: B.Tech., Status of the Course: MAJOR, Approved Since Session: 2012-13
Credits: 3, Periods (55 mts. each) per week: 3(L:3+T:0+P:0), Min. Periods/Sem.: 39

UNIT 1: WAVES AND OSCILLATIONS
Traveling wave in one dimension, wave equation, examples, simple harmonic motion, examples: simple pendulum, LC circuit, damped oscillation, forced oscillation and resonance, origin of refractive index, dispersion.
UNIT 2: ACOUSTICS
Characteristics of musical sound, loudness, Weber-Fechner law, decibel, absorption coefficient, reverberation, reverberation time, Sabine's formula, acoustics of buildings. Ultrasonic production: Magnetostriction and piezoelectric methods, determination of velocity of ultrasonic waves (acoustic grating), applications.
UNIT 3: LAWS OF THERMODYNAMICS
Concept of mole, ideal gas, heat capacity, exact differential, First Law, Meyer's relation, isothermal and adiabatic processes, work done, Second Law, Carnot engine, Carnot's theorem, Kelvin's scale of temperature, Clausius' theorem and entropy, First Law revisited, statistical interpretations of temperature and entropy.
UNIT 4: CRYSTALLOGRAPHY
Crystalline and amorphous solids, system of crystals, symmetry operation, Miller indices, atomic radius, coordination number, atomic packing factor calculation, X-ray diffraction, powder photograph method. Liquid crystal, photonic crystal and nano-materials.
UNIT 5: QUANTUM MECHANICS
Inadequacy of classical mechanics, wave and particle duality of radiation, de Broglie concept of matter waves, Heisenberg's uncertainty principle, Schrodinger's wave equation, interpretation of wave function, eigenvalues and eigen functions, superposition principle, particle confined in one dimensional infinite square well potential.

SUGGESTED READINGS:
Physics for Scientists and Engineers Vols. I, II, III, Douglas C. Giancoli, Prentice Hall, 2008.
Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons (2001).
Berkeley Physics Course Vol. 1-5, Tata McGraw Hill (2008).
Feynman Lectures in Physics, Vols. 1-3, Pearson, 2008.

Course Number: PHM182, Course Title: APPLIED PHYSICS LAB.
Class: B.Tech., Status of the Course: MAJOR, Approved Since Session: 2012-13
Credits: 1, Periods (55 mts. each) per week: 2(L:0+T:0+P:2+S:0), Min. Periods/Sem.: 26

Based on Theory Course.

Course Number: MEM101, Course Title: GRAPHIC SCIENCE
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: GENERAL SCALES, LETTERING, VARIOUS TYPES OF PROJECTIONS
Projection of Points and Lines: Elements of projection. Problems of points and lines. Trace True length, inclination and shortest distance.
Projections of Planes and Solids: Projection of plane figures. Traces of planes. Angle of Inclination of planes. Problems of points and planes, lines and planes. Angle between line and plane. Point of intersection. Intersection of planes. Dihedral angle.
Projection of solids such as prism, pyramid, cylinder, cone, sphere. Auxillary views. Plane sections.
UNIT 2: INTERSECTION AND DEVELOPMENT OF SURFACES
Intersection of cylinders, cones, prisms, pyramids. Development of various surfaces including the interpenetrated and sectioned solids.
UNIT 3: ISOMETRIC PROJECTION
Isometric scale. Projection of geometrical solids and various types of wood joints.
UNIT 4: PLANE GEOMETRY
Construction and drawing of curves such as Parabola, Ellipse, Hyperbola, Involute, Cycloid, & Helix.
UNIT 5: MACHINE DRAWING (THROUGH WORK-BOOK)
First and third angle projections. Orthographic views from the supplied blocks and isometric drawings (sketching only) missing lines and missing views. Views full in section. Rules for dimensioning. Printing. Size and location of dimensioning. B.I.S. codes and conventions. Drawing of different machine parts (single pieces) with dimensioning.
NOTE: Projections to be practiced by first angle projection as per B.I.S. recommendations.

SUGGESTED READING:
Laxminarayanan VV: PRACTICAL GEOMETRY
Bhatt ND: ENGINEERING DRAWING
Aggrawal SD: WORK-BOOK ON ENGINEERING DRAWING

Course Number: MEM102, Course Title: ENGINEERING DRAWING I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 7(L:0+T:0+P:7+S:0), Min.pds./sem: 91

UNIT 1: PROJECTION OF POINTS AND LINES
Elements of projection. Problems of points and lines. Trace True length, inclination and shortest distance.
PROJECTIONS OF PLANES AND SOLIDS: Projection of plane figures. Traces of planes. Angle of Inclination of planes. Problems of points and planes, lines and planes. Angle between line and plane. Point of intersection. Intersection of planes. Dihedral angle.
Projection of solids such as prism, pyramid, cylinder, cone, sphere. Auxillary views. Plane sections.
UNIT 2: INTERSECTION AND DEVELOPMENT OF SURFACES
Intersection of cylinders, cones, prisms, pyramids. Development of various surfaces including the interpenetrated and sectioned solids.
UNIT 3: ISOMETRIC PROJECTION
Isometric scale. Projection of geometrical solids and various types of wood joints.
UNIT 4: PLANE GEOMETRY
Construction and drawing of curves such as Parabola, Ellipse, Hyperbola, Involute, Cycloid, and Helix.
UNIT 5: MACHINE DRAWING (THROUGH WORK-BOOK)
First and third angle projections. Orthographic views from the supplied blocks and isometric drawings (sketching only) missing lines and missing views. Views full in section. Rules for dimensioning. Printing. Size and location of dimensioning. B.I.S. codes and conventions. Drawing of different machine parts (single pieces) with dimensioning.
NOTE: Projections to be practiced by first angle projection as per B.I.S. recommendations.

SUGGESTED READING:
Laxminarayanan VV: PRACTICAL GEOMETRY
Bhatt ND: ENGINEERING DRAWING
Aggrawal SD: WORK-BOOK ON ENGINEERING DRAWING

Course Number: MEM103, Course Title: MANUFACTURING PROCESSES I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2013-14
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39

UNIT 1: INTRODUCTION TO MANUFACTURING
Manufacturing processes and their classification. Socio-economic role. Role of sustainability in manufacturing.
Industrial Safety: Introduction, types of accidents, causes and common sources of accidents, methods of safety, first aid.
Engineering Materials: Introduction, classification, properties, types and applications. Metallic materials (ferrous and non-ferrous metals & their alloys) and Non-metallic materials (Wood, ceramics & plastics). Elementary introduction to heat treatment.
Wood & Wood Working: Timber, Classification, structure, conversion, seasoning, defects and preservation of Timber. Joinery, painting and varnishing. Hand tools used in carpentry. Typical operations. Artificial woods. Adhesives.
UNIT 2: PRINCIPLES OF METAL CASTING
Pattern: Materials, types allowances and color codes. Elements of gating system.
Moulding: Process, tools, sand, materials, classification of moulds, methods (Shell, CO2 and vacuum moulding). Machines. Cores. Melting furnaces and their operation.
Casting: Expendable-mould processes (Sand, plaster, ceramic, rubber and expendable-graphite mould casting, lost-wax and lost-form processes), Multi-use-mould processes (Gravity & pressure-die casting and centrifugal casting). Casting defects.
UNIT 3: DEFORMATION PROCESSES
Bulk Deformation Processes: Basic concepts of plastic deformation. Hot & cold working of metals. Theory and principle of common bulk deformation processes (Rolling, forging, extrusion and drawing). Forging hammers, Drop hammers (Mechanical, friction board and belt type). Metal forming defects.
Sheet Metal Processes: Introduction.
UNIT 4: WELDING
Gas and Arc welding processes. Fluxes. Filler materials. Resistance welding processes (spot, seam, Flash, butt and procession). Welding defects. Types of joints and edge preparation.
UNIT 5: BASICS OF METAL CUTTING & MACHINE TOOLS
Machine Tools: Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear. Use of Coolants in machining. Construction, specification, working principles and operations of machine tools such as Lathe, Drill, Milling, Sawing, Shaper, Planer, Grinder and Slotter. Estimation of speed, feed, depth of cut and time.

SUGGESTED READINGS:
MANUFACTURING PROCESSES FOR ENGINEERING MATERIALS: Serope Kalpakjian & Steven R. Schmid (Pearson Eduction)
DEGARMO'S MATERIALS & PROCESSES IN MANUFACTURING: J.T. Black & Ronald A. Kohser (John Wiley & Sons, Inc.)
MANUFACTURING PROCESSES: B.H. Amstead, Phillip F. Ostwald & Myron L. Begeman (John Wiley & Sons, Inc.)
PROCESSES AND MATERIALS OF MANUFACTURE: Roy A. Lindberg (PHI Learning Pvt. Ltd.)
WORKSHOP TECHNOLOGY (Vol. I to II): B.S. Raghuwanshi (Dhanpat Rai & Co.)
WORKSHOP TECHNOLOGY (Vol. I to III):W.A.J. Chapman (CBS Publishers & Distributors Pvt. Ltd.)
MANUFACTURING SCIENCE, Amitabh Ghosh & Ashok Kr Mallik (Affiliated East West Press Pvt. Ltd.)

Course Number: MEM104, Course Title: WORKSHOP PRACTICE I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1.5, Periods (55 mts. each)/week: 3(L:3+T:0+P:3+S:0), Min.pds./sem: 39

Moulding Shop: Practice of making different moulds from patterns (a) Bevel Gear (b) Fan Back Cover (c) Pulley (d) File Handle. Finally casting practice. Demonstration of moulding tools etc.
Fitting Shop: (a) Demonstration of fitting tools (b) Practice of filling hacksawing, marking, cutting, chipping, measuring etc. on MS pcs.
Carpentry Shop: (a) Demonstration of carpentry tools (b) Practice of plaining, marking, measuring, cutting by chisels (firmer, dovetail & mortise), sawing etc. on *Chir* wood.
Practice of making different joints: (a) Cross lap joint (b) Corner lap joint (c) Mortise & Tennon joint (d) Tee-Lap joint.

Course: MAM181, Title: ENGINEERING MATHEMATICS I
Class: B. Tech., Status of Course: MAJOR COURSE, Approved since session: 2017-18
Total Credits: 3, Periods (55 mts. each)/week:3(L-3-0+P/S-0), Min pds./sem:39

UNIT 1
Linear independence of vectors, Rank of a matrix, Solution of system of linear simultaneous equations, Characteristics roots and vectors, Cayley-Hamilton theorem.
UNIT 2
Functions of one variable: $\epsilon - \delta$ definition of limit and its applications, Mean value theorems, indeterminate forms, successive differentiation, Liebnitz theorem.
UNIT 3
Functions of several variables: Limit of real valued functions of several variables, Partial, directional and total derivative, Euler's theorem, Taylor Series(in one and two variables), Maxima and Minima, Jacobians.
UNIT 4
Limit of vector valued functions of one variable, Differentiation and Integration of vector valued functions, arc length, Double and Triple Integrals and their applications to area and volume.
UNIT 5
Gradient, Divergence and curl. Line and Surface Integrals, Gauss, Green's and Stroke's Theorem (without proof). Simple Applications.

SUGGESTED READINGS:
THOMAS & FINNEY :CALCULUS AND ANALYTICAL GEOMETRY
E KREYSZIG : ADVANCED ENGINEERING MATHEMATICS
B S GREWAL: ENGINEERINGMATHEMATICS

Course Number: GKC181, Course Title: SC. METH., G.K. & CURRENT AFFAIRS I
Class: B.Tech., Status of Course: Core Course, Approved since session: 2016-17
Total Credits: 1, Periods (55 mts. each)/week: 1 (L:1+T:0+P:0+S:0), Min.pds./sem.: 13

UNIT 1: GEOGRAPHY INDIA
Location, Physical Features, Major mountains, rivers, ocean, demographic background, States and Union Territories, population, literacy and other facts, Dams and rivers, Important towns and the rivers on which they are located, National Parks and Wild Life Sanctuaries, Railways, Civil aviation, Major ports, Crops and minerals.
UNIT 2: GEOGRAPHY WORLD
Our Solar System (Sun and nine planets), Earth- rotation (or the daily rotion), revolution (the annual motion), latitudes and longitudes, Continents, Oceans, Seas, Peaks, Major rivers, Famous Waterfalls, Major countries of the world and their Capitals, Languages, Religions & Location, Major crops, Mineral wealth and their producer countries.
UNIT 3: HISTORY-INDIA
Important dates of Indian History from Indus Valley Civilization to present day, History of Indian Independence, Historically important Places, Important dates and days.
UNIT 4: HISTORY-WORLD
Main civilization of ancient times, World Wars-their causes. Important events and dates in World History. Ancient Monuments, Important Places.
UNIT 5: ENVIRONMENTAL STUDIES-NATURAL RESOURCES
(a) Multidisciplinary Nature of Environmental Studies- Definition, Scope and Importance, Need for Public Awareness (b) Natural Resources- Forest, Water, Mineral, Food, Energy, Land, Animal Products, Role of Individual in Conservation of Natural Resources, Equitible use of Resources for Sustainable Life Style.

SUGGESTED READING:
NCERT: TEXT BOOKS ON HISTORY, GEOGRAPHY, CIVICS — MANORAMA YEAR BOOK
MR Agarwal: GENERAL KNOWLEDGE DIGEST
NEWS PAPAERS AND MAGAZINES:
HINDI & ENGLISH DAILY NEWS PAPERS — INDIA TODAY
COMPETITION MASTER — SPORTS STAR
COMPETITION SUCCESS REVIEWS

Course Number: RDC181, Course Title: AGRICULTURAL OPERATIONS I
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits: 1.0, Periods (55 mts. each)/week: 3 (L:1+T:0+P:2+S:0), Min.pds./sem: 39

Land Surveying: Introduction. Measurement of distance. Different types of instruments used in measurements. Obstacles in measurement.
(a) Chain Surveying-Instruments used. Method of conducting and plotting. Compass survey. Instruments required. Method of conducting and plotting.
(b) Plane Table Survey. Various instruments used. Different methods of conducting plane table survey.
(c) Levelling. Instruments used. Method of conducting levelling to find out longitudinal sector along a line.
Agriculture Farming: Importance of Agriculture in Indian economy and life. Soil. Its constituents. Their importance and classification.
Preparation of land for Agriculture Farming: Levelling. Ploughing. Watering. Manuring.
Different Operations of Farming: Sowing, Weeding, Interculture, Harvesting.

Course Number: RDC182, Course Title: SOCIAL SERVICE
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2 (L:0+T:0+P:2+S:0), Min.pds./sem: 26

The students are exposed to social service and youth activities in and around the campus to inculcate social upliftment through dignity of labour and moral values.

Course Number: BBH101, Course Title: BUSINESS ORGANISATION
Class: B.Tech., Status of Course: HALF COURSE, Approved since session: 2016-17
Total Credits:3, Periods(55 mts. each)/week: 4(L-4+ T-O+P/S-O), Min.pds./sem.: 52
[SAME AS BAH231/251/291]

UNIT 1: INTRODUCTION [10 pds]
Nature, Object, Meaning and Importance of Business Organisation. Social Responsibilities of Business. Functions of Business Organisation.

UNIT 2: FORMS OF BUSINESS ORGANISATION [10 pds]
Factors Determining the Forms of Business Organisation, Sole Proprietorship, Partnership.

UNIT 3: JOINT STOCK COMPANIES [15 pds]
Definition, Kinds, Formation, Management, Meetings & Winding up.

UNIT 4: ADVERTISING [10 pds]
Meaning, Object and Advertising Media, Importance of Advertisement and Advertisement Copy.

UNIT 5: STOCK & PRODUCE EXCHANGES [7 pds]
Meaning, Functions, Importance and Control of Stock & Produce Exchanges.

SUGGESTED READINGS:
Bhushan YK: BUSINESS ORGANISATION & MANAGEMENT Shukla MC: BUSINESS ORGANISATION & MANAGEMENT
Sharlekar SA: MODERN BUSINESS ORGANISATION AND MANAGEMENT
Jagdish Prakash: BUSINESS ORGANISATION AND MANAGEMENT
Agarwal RC: BUSINESS ORGANISATION AND MANAGEMENT (HINDI)
Mehrotra HC & Gupta BS: BUSINESS ORGANISATION AND MANAGEMENT (HINDI)
Bhushan YK: BUSINESS ORGANISATION AND MANAGEMENT (HINDI) Gupta CB: BUSINESS ORGANISATION

Course Number: BOH181, Course Title: ENVIRONMENTAL SCIENCES
Class: B.Tech., Status of Course: NF HALF COURSE, Approved since session: 1998-99
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39

UNIT 1 [8 pds]
Definition Environment, Atmosphere, Hydrosphere, Lithosphere and Biosphere. Biomass and productivity; Energy Flow.

UNIT 2 [8 pds]
Conservation & Management of Environment; Biodiversity. Organizations. and movements involved in conservation of Environment. From Stockholm to Rio_de_Janerio.

UNIT 3 [8 pds]
Pollution of air, water and soil and its abatement.

UNIT 4 [8 pds]
Environment and physiological adaptations in animals and man.

UNIT 5 [7 pds]
Biotechnology and Environment. Intellectual Property Rights (IPR) and Protection (IPP).

SUGGESTED READINGS:
Sharma PD: ENVIRONMENTAL BIOLOGY
Gupta PK: BIOTECHNOLOGY
Ambast RS: ENVIRONMENTAL POLLUTION AND MANAGEMENT
Hester RE: UNDERSTANDING OUR ENVIRONMENT

Course Number: CEH181, Course Title: THEORY OF DESIGN
Class: B.Tech., Status of Course: NF HALF COURSE, Approved since session: 2014-15
Total Credits: 3, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem.: 39

UNIT 1: SHAPE, COLOR AND TEXTURE [8 pds]
An introduction to various design elements such as line, shape, mass, colour etc including the theoretical aspects such as properties of line compositions, family of shapes, percepts.
UNIT 2: ANALYSIS OF FORMS AND COLOR THEORY [8 pds]
Making two dimensional and three dimensional compositions involving various elements of design such as Line, Shape, Color, Texture, Transparency, Mass, Space etc., aimed at understanding the principles of design such as Repetition, Harmony, Contrast, Dominance, Balance, Dynamism, etc.
UNIT 3: THREE DIMENSIONAL SCULPTURES [8 pds]
Making three dimensional sculptures involving the basic platonic solids and abstract sculptures using various techniques/ materials such as POP, wire/ matchstick, soap, clay etc., involving the principles of art.
UNIT 4: ANALYSIS OF SIMPLE OBJECTS [8 pds]
Critical analysis of simple man-made objects to understand the underlying concepts in their design. Studies to understand function- Aesthetic Relationship, and Anthropometrics.
UNIT 5: ARCHITECTURAL DOCUMENTATION [7 pds]
A simple buildings, design of utilitarian spaces, waiting spaces, living spaces, working spaces, design of simple structure- additive and subtractive forms.

SUGGESTED READINGS:
Charles Wallschlaeger & Synthia Busic Snyder, Basic Visual Concepts & Principles for artists, architects & designers, Mc Graw hill, USA, 1992.
Paul Zelanski & Mary Pat Fisher, Design principles & problems, 2nd Ed, Thomson & Wadswoth, USA, 1996
Owen Cappleman & Michael Jack Kordan, Foundations in Architecture: An Annotated Anthology of beginning design projects, Van Nostrand Reinhold, New York.
Rewin Copplestone, Arts in Society, Prentice Hall Inc, Englewood Cliffs, N.J. 1983.
Paul Laseau, Graphic Thinking For Architects and Designers, John Willey & Sons, New York, 2001

Course Number: DPH181, Course Title: ART APPRECIATION
Class: B.Tech., Status of Course: NFH COURSE, Approved since session: 1998-99
Total Credits: 3, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem.: 39

1) Work 1 [9 pds]
2) Work 2 [9 pds]
3) Work 3 [9 pds]
4) Work 4 [9 pds]
5) Sketching work 30 nos. [3 pds]
NOTE: Designing based on (a) Ornamental Geometrical and Abstract Motifs (b) Enlargement (c) Greeting Card (d) Painting.

Course Number: ECH181, Course Title: ESSENTIALS OF ECONOMICS
Class: B.Tech., Status of Course: HALF COURSE, Approved since session: 2016-17
Total Credits: 3, Periods (55 mts. each)/week: 3(L-3+T-0+P/S-0), Min.pds./sem.:39

UNIT 1: NATURE AND SCOPE OF ECONOMICS
Meaning and Definitions of Economics; Scarcity and Choice; Economic Problem; Opportunity sets; Economic System; Role of Price Mechanism; Positive and Normative Economics; Microeconomics and Macroeconomics
UNIT 2: THEORY OF CONSUMER BEHAVIOUR
Demand; Law of demand; Elasticity of demand-degrees, types and methods of measurement; Law of supply; Utility Analysis
UNIT 3: THEORY OF PRODUCT PRICING
Market forms; Cost and Revenue Analysis; Price and output determination under Perfect competition, Imperfect competition and Monopoly
UNIT 4: THEORY OF FACTOR PRICING
Nature of Factor Market; Marginal productivity theory; Concept of Rent, Wages, Interest and Profit
UNIT 5: INFLATION AND RECESSION
Meaning, causes, consequences and control of Inflation, Recession and Stagflation; Commercial Banks: Functions, Credit Creation and New Products; Role of Central Bank and credit control

SUGGESTED READINGS:
Lipsey, R.G. and Chrystal, K.E.: An Introduction to Positive Economics, OUP
Karl E. Case and Ray C. Fair, Principles of Economics, Pearson Education, Inc., 8th edition, 2007
N. Gregory Mankiw, Economics: Principles and Applications, India edition by Southwestern, a part of Cengage
Richard T. Froyen, *Macroeconomics*, Pearson Education Asia, 2nd edition, 2005

Course Number: ENH181, Course Title: ENGLISH I
Class: B.Tech., Status of Course: NF HALF COURSE, Approved since session: 2009-10
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1
(a) Phrase, Clause, Sentence- kinds, concepts and uses (b) Reported speech (c) Active and Passive voice.
UNIT 2
(a) Articles (b) Concord.
UNIT 3
(a) Verbs and properties of Verbs (b) Punctuation Marks (c) Anomalous Finites.
UNIT 4
(a) Time Tense and Tense Sequence (b) Conditional (c) Question Tags.
UNIT 5
Word Formation and Word Power.

SUGGESTED READINGS:
Wood FT: A REMEDIAL ENGLISH GRAMMAR FOR FOREIGN STUDENTS
Allen WS: LIVING ENGLISH STRUCTURE: A PRACTICE BOOK FOR FOREIGN STUDENTS

Course Number: MUH181, Course Title: SANGEET KRIYATMAK I
Class: B.Tech., Status of Course: NF HALF COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem.: 39

UNIT 1: Sargam evam Alankar
UNIT 2: Bhajan
UNIT 3: Patriotic Song
UNIT 4: Raag Yaman ki Bandish
UNIT 5: Taal-Dadra, Keherwa, Roopak evem Teentaal

Course Number: OMH101, Course Title: COMMUNICATION TECHNIQUES HINDI I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2016-17
Total Credits: 3, Periods (55 mts. each)/week: 3 (L-3+T-0+P/S-0), Min.pds./sem: 39

UNIT 1: ¶É¤nù ®úSÉxÉÉ - ´ªÉÉEò®úhÉ

Ê½þxnùÒ ´ÉhÉÇ¨ÉÉ±ÉÉ, (JÉ) ¶É¤nù ¦Énù: Ê´ÉEòÉ®úÒ ¶É¤nù (Ê´É¶Éä¹ÉhÉ, ÊGòªÉÉ,ºÉÆYÉÉ ¡ÉlÉÉ ºÉ´ÉÇxÉÉ¨É), (MÉ) +Ê´ÉEòÉ®úÒ ¶É¤nù (ÊGòªÉÉ Ê´É¶Éä¹ÉhÉ, ºÉÆ¤ÉÆvÉ ¤ÉÉävÉEò, ºÉ¨ÉÖSSÉªÉ ¤ÉÉävÉEò, Ê´É®ú¨ÉªÉ ¤ÉÉävÉEò)

UNIT 2: ¶É¤nù ®úSÉxÉÉ - ´ªÉÉEò®úhÉ

(Eò)¶É¤nù®úSÉxÉÉ: ºÉÆYÉÉ ºÉä Ê´É¶Éä¹ÉhÉ ¡ÉlÉÉ ÊGòªÉÉ ¤ÉxÉÉxÉÉ/ÊGòªÉÉ ºÉä Ê´É¶Éä¹ÉhÉ ¡ÉlÉÉ ºÉÆYÉÉ ¤ÉxÉÉxÉÉ, (JÉ)={ÉºÉMÉÇ +Éè®ú |ÉiªÉªÉ, (MÉ) º¨ÉÖSSÉÉÊ®úiÉ ¶É¤nù

UNIT 3: Ê´É®úÉ¨É ÊSÉx½þ

(Eò) Ê´É®úÉ¨É ÊSÉ¼xÉ, Ê´É®úÉ¨É ÊSÉ¼xÉÉå EòÒ ={ÉªÉÉäÊMÉiÉÉ ¡ÉlÉÉ =ºÉEäò ¦Énù, (JÉ) Ê´É®úÉ¨É ÊSÉ¼xÉÉå Eäò +xªÉ ¦Énù - I (ÊxÉnæù¶ÉEò ÊSÉ¼xÉ, +{ÉÚhÉÇ Ê´É®úÉ¨É, Ê´É´É®úhÉ ÊSÉ¼xÉ, ªÉÉävÉEò, ºÉÆlÉä{É ÊSÉ¼xÉ) (MÉ) Ê´É®úÉ¨É ÊSÉ¼xÉÉå Eäò +xªÉ ¦Énù - II (=nùÉ½þ®úhÉ ÊSÉ¼xÉ, EòÉä¹`öEò, ½ÆþºÉ{Énù, ±ÉÉä{É ªÉÉ ÊxÉnæù¶É ÊSÉ¼xÉ, ºÉ¨ÉÉxÉiÉÉºÉÚSÉEò)

UNIT 4: +¶ÉÖÊuùªÉÉÄ B´ÉÆ =xÉEòÉ ºÉÆ¶ÉÉävÉxÉ

(Eò) ¶É¤nùÉå ºÉÆ¤ÉÆvÉÒ ºÉÉ¨ÉÉxªÉ +¶ÉÖÎvnùªÉÉÄ ¡ÉlÉÉ =xÉEòÉ ºÉÆ¶ÉÉävÉxÉ, (JÉ) ´ÉÉCªÉ ºÉÆ¤ÉÆvÉÒ +¶ÉÖÊrùªÉÉÄ B´ÉÆ =xÉEòÉ ºÉÆ¶ÉÉävÉxÉ, (MÉ) ´ÉÉCªÉ ºÉÆ¤ÉÆvÉÒ +xªÉ +¶ÉÖÊrùªÉÉÄ B´ÉÆ =xÉEòÉ ºÉÆ¶ÉÉävÉxÉ

UNIT 5: +xÉÖ´ÉÉnù B´ÉÆ ÊxÉ¤ÉxvÉ

(Eò) +xÉÖ´ÉÉnù, +xÉÖ´ÉÉnùEò Eäò MÉÖhÉ, +xÉÖ´ÉÉnù |ÉÊGòªÉÉ, (JÉ) +ÆOÉävÉÒ ºÉä Ê½þxnùÒ +xÉÖ´ÉÉnù, +ÆOÉävÉÒ ºÉä Ê½þxnùÒ +xÉÖ´ÉÉnù EòÒ ¦ÉÚ±Éå ¡ÉlÉÉ =xÉEòÉ ÊxÉ®úÉEò®úhÉ, (MÉ) ÊxÉ¤ÉxvÉ

Course Number: PYH181, Course Title: INTRODUCTION TO PSYCHOLOGY
Class: B.Tech., Status of Course: HALF COURSE, Approved since session:1998-99
Total Credits:3, Periods(55 mts. each)/week:4(L-4+T-0+P/S-0), Min.pds./sem.:52

UNIT 1: (a) What is Psychology? Its scope and methods (b) Nervous system-(i) C.N.S. (ii) A.N.S. (iii) P.N.S.
UNIT 2: (a) Attention-Meaning, Kinds and Determinants (b) Perception-definition, characteristics, Process, Gestalt approach (c) Illusions: Causes and Types.
UNIT 3: (a) Learning-Meaning, Types, Theories-Thorndike, Kohler, Pavlov, Skinner.
UNIT 4: (a) Memory-Definition, Types, Basic Model; Forgetting: Meaning and causes (b)

Intelligence- Nature and measurement.
UNIT 5: (a) Motives-Nature and Types (b) Personality-Development, determinants, Types.

SUGGESTED READINGS:

Ruch: PSYCHOLOGY AND LIFE
Hilgard ER and Atkinson RC: INTRODUCTION TO PSYCHOLOGY
Munn NL: INTRODUCTION TO PSYCHOLOGY
Garrett HE: GENERAL PSYCHOLOGY
Baron RA: PSYCHOLOGY

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Course Number: PHM281, Course Title: APPLIED PHYSICS II
Class: B.Tech., Status of the Course: MAJOR, Approved Since Session: 2012-13
Credits: 3, Periods (55 mts. each) per week: 4(L:3+T:1+P:0), Min. Periods/Sem.: 39

UNIT 1: LASERS AND FIBER OPTICS
Spontaneous and stimulated emissions, Einstein's coefficients, population inversion and lasing action, coherence, properties and types of lasers, applications, Fermat's principle and Snell's law, optical fiber, numerical aperture, types of fibers, fiber optic communication principles, fiber optic sensors.
UNIT 2: CONDUCTORS, DIELECTRICS AND MAGNETIC MATERIALS
Free electron theory (classical and quantum), Fermi-Dirac statistics, band theory of solids, dielectrics, types of polarization, internal field and Clausius-Mosotti equation, ferroelectric materials, magnetic materials, types and properties, domain theory, hard and soft magnetic materials, application, superconductivity and types, Meissner effect, high temperature superconductors, applications.
UNIT 3: NUCLEAR PHYSICS
Laws, units of activity, half-life, mean life and decay constant, measurement of decay constant, detectors of nuclear radiation, ionization, proportional and Geiger Muller counters, uses of nuclear radiations. Nuclear size, Carbon dating, binding energy and packing fraction.Nuclear fission and fusion, basic nuclear reactors.
UNIT 4: SPECIAL THEORY OF RELATIVITY
Frames of reference, laws of mechanics, inertial frame of reference, Galilean transformation, hypothesis of Galilean invariance, Non-inertial frames and fictions forces, centrifugal force, Michelson-Morley experiment, postulates of the special theory of relativity, Lorentz transformation and addition of velocities, conservation of momentum and variations of mass, relativistic energy, Mass-energy and momentum-energy relation, particles with zero rest mass.
UNIT 5: ELECTRODYNAMICS
Coulomb's law for distribution of charges, polarization and Gauss's law, electric current and equation of continuity, magnetic induction and Lorentz force, steady current and Biot-Savart law, Ampere's law, magnetization and magnetic intensity, Faraday's law of induction, generalization of Ampere's law, Maxwell's equation, electromagnetic wave equation, propagation of EM waves in free space Poynting vector.

SUGGESTED READINGS:
Physics for Scientists and Engineers Vols. I, II, III, Douglas C. Giancoli, Prentice Hall, 2008.
Fundamentals of Physics, 6th Edition, D. Halliday, R. Resnick and J. Walker, John Wiley and Sons (2001).
Berkeley Physics Course Vol. 1-5, Tata McGraw Hill (2008).
Feynman Lectures in Physics, Vols. 1-3, Pearson, 2008.
Foundations of Electromagnetic Theory, 3rd edition, J.R. Reitz, F.J. Milford and R.W. Christy, Narosa (1979).

Course Number: PHM282, Course Title: APPLIED PHYSICS LAB.
Class: B.Tech., Status of the Course: MAJOR, Approved Since Session: 2012-13
Credits: 1, Periods (55 mins. each) per week: 3(L:3+T:1+P:0), Min. Periods/Sem.: 40

Based on Theory Course.

Course Number: EEM201, Course Title: COMPUTER CONCEPTS & C PROGRAMMING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2021-22
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: COMPUTER SYSTEM ELEMENTS
Essential computer hardware – CPU, memory, input & output, storage, factors affecting processing speed; Software – system software, application software; Operating systems: functions, features and examples of modern OS. Problem Solving using Computer Programs: Concept of an algorithm, heuristics, Flowcharts and pseudo-code. Programming Languages: machine, assembly language and high level languages; assemblers, compilers and interpreters, examples.
UNIT 2: C LANGUAGE ELEMENTS
Pre-processor directives, identifiers and reserved words, fundamental data types and variables, statements, standard input & output functions, general form of a C program.
Operators and Expressions: arithmetic, logical and relational operators, unary operators, conditional operators, mixed operands and type conversion, Operator precedence and associativity.
UNIT 3: Control Structure AND MODULAR PROGRAMMING
Control Structures: Conditions, selection: if statement, nested if-else statement, switch statement, using break and default with switch; iteration: while, do-while and for statements, nesting in loops; using the break and continue statements.
Modular Programming: Defining and accessing functions, function prototypes, passing arguments to functions by value, recursion. Storage classes: automatic, external, static and register.
The standard C library: math functions like pow, sin etc., and other standard library functions
UNIT 4: ARRAYS, STRUCTURES & UNIONS AND POINTERS: Array notation, declaring and referencing arrays, manipulation of array elements, multi-dimensional arrays.
Structures and Unions: Purpose of using structures, declaring and assigning structures, unions.
Pointers: Pointer fundamentals and pointer arithmetic, pointers and arrays, pointer references as function arguments, dynamic memory allocation.
UNIT 5: FILE HANDLING AND STANDARD C-LIBRARY
Data Files: introduction to files, basic operations to open, close, read and write to data files. Command line arguments in C
Standard C Library: The standard C library; Examples of functions including I/O- fopen, fread etc.; string handling functions, math functions like pow, sin etc. and other standard library functions.

SUGGESTED READINGS:
Byron S Gottfried: PROGRAMMING WITH C, 2nd Edition, Tata McGraw Hill.
Jeri R. Hanly and Elliot B. Koffman: PROBLEM SOLVING AND PROGRAM DESIGN WITH C, 6th Edition, Pearson.
Peter Norton: INTRODUCTION TO COMPUTERS, Tata McGraw Hill.
Dennis P Curtin et. Al.: INFORMATION TECHNOLOGY THE BREAKING WAVE, Tata Mc Graw Hill.
Patvardhan C: INTRODUCTION TO COMPUTERS AND PROGRAMMING IN C, Khanna Book Publishing.
Rajaram V: FUNDAMENTALS OF COMPUTERS, Prentice Hall of India, New Delhi.

Course Number: EEM202, Course Title: BASIC ELECTRICAL ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2004-05
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem: 39

UNIT 1: CIRCUIT ANALYSIS
Review of basic concepts of units, voltage, current, energy, etc. R, L, and C - their geometrical, electrical and energy view point. Ohm's law, KVL, KCL, Mesh Analysis and Nodal Analysis. Thevenin's and Norton's Superposition theorem. Maximum Power Transfer Theorem. Star Delta conversion.
UNIT 2: AC CIRCUITS
Principles of single phase and three phase generation (qualitative treatment only). Steady state analysis of RC, RL and RLC circuits for sinusoidal excitation. Phasor notation, RMS Values, Power Factor. Resonance. Complex Power, active and reactive power. 3-phase (balanced & unbalanced) system.
UNIT 3: MAGNETIC CIRCUITS AND TRANSFORMERS
Ampere's Circuital law and Constant Flux Theorem. B-H curve, Magnetic circuit calculations. Hysteresis and Eddy Current losses. Transformers: construction emf-equation ratings phasor diagram on No-load and Full-load, e.g. circuits, Open circuits and short circuit test, efficiency and regulation operation of auto transformers.
UNIT 4: ELECTRICAL MACHINES
Classification, construction, emf and torque production. Characteristics of DC motors and generators, application. Induction motors: revolving magnetic field, principle of torque production, ratings, construction (squirel cage and would rotor) Torque speed characteristics. Application.
UNIT 5: ELECTRICAL MEASUREMENTS
PMMC meters, moving iron ammeter and voltmeter. Dynamometer wattmeter, AC energy meter. Extension of instrument ranges.

SUGGESTED READING:
BASIC ELECTRICAL ENGINEERING: Kothari & Nagrath
HUGHES ELECTRICAL TECHNOLOGY: (Revised by) I Mckenzie, Smith
ELECTRICAL ENGINEERING FUNDAMENTALS: V Del Toro

Course Number: EGC281, Course Title: INDUSTRIAL VISITS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1

The students visits various industries to get an exposure to the various operations, processes etc. in different types of industries.

Course Number: MEM201, Course Title: ENGINEERING THERMODYNAMICS

Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session-2013-14

Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1

Basic Concepts and Definitions: System. Introduction and definition of thermodynamics; Dimensions and units, Microscopic and Macroscopic approaches; System, surroundings and universe, Concept of continuum, Control system boundary, control volume and control surface. Properties and state, Thermodynamic properties, Thermodynamic path, process and cycle, Thermodynamic equilibrium, Reversibility and irreversibility, Quasi static process, Energy and its forms, Work and hear. Gas laws, Idea gas, Specific Heats and their calculations.

Zeroth Law of Thermodynamics: Zeroth law of thermodynamics, Temperature and its measurement, Temperature scales.

UNIT 2

First Law of Thermodynamics: Thermodynamic definition or work, Thermodynamic processes, Calculation of work in various processes and sign convention, Non-flow work and flow work, Joules' experiment, First law of thermodynamics, Internal energy and enthalpy, First law of thermodynamics applied to open systems, Steady flow systems and their analysis, Steady flow energy equation, Application of equation to Boiler, Condenser, Evaporator, Turbine, Nozzle, Compressor (Rotary & Reciprocating), Throttling process etc., Introduction to unsteady processes such as filling and evacuation of vessels with and without heat transfer, PMM-I.

UNIT 3

Second Law of Thermodynamics: Limitations of first law of thermodynamics, Devices converting heat to work, Thermal reservoir, Heat engines, Efficiency, Devices converting work to heat, Heat pump, refrigerator, Coefficient of Performance, Reversed heat engine, Kelvin's-Plank's statement of second law of thermodynamics, Clausius statement of second law of thermodynamics, Equivalence of two statements of second law of thermodynamics, Reversible and irreversible processes, Carnot cycle and Carnot engine, Carnot theorem and it's corollaries. Thermodynamic temperature scale, PMM-II.

Entropy: Clausius inequality, Concept of Entropy, Entropy change in different thermodynamic processes, Tds equation, Principle of entropy increase, T-S diagram, Statement of the third law of thermodynamics.

Availability and Irreversibility: Available and unavailable energy, Availability and Irreversibility, Second law efficiency.

UNIT 4

Properties of Steam: Pure substance, Property of steam, Triple point, Critical point, Sub-cooled liquid, Saturation states, Superheated states, Phase transformation process of water, Graphical representation of pressure, volume and temperature (P-V-T surfaces), P-T & P-V diagrams. T-S and H-S diagrams, use of property diagram. Steam-Tables & Mollier charts, Dryness fraction and its measurement.

UNIT 5

Real Gases: Deviation of real gases from ideal gases. Different forms of the equation of state. Reduced properties. Compressibility factors chart. Maxwell relations. Joule-Thomson coefficient, Clapeyron's equation.

Engines: Steam Engines- Constructional details and working.

Introduction of IC Engines: Otto and Diesel cycle (No numerical), Working of compression Ignition engines, spark Ignition engines, 2 stroke and 4 stroke engines, Theoretical & actual indicator diagrams and valve timing diagrams.

SUGGESTED READING:

Cengel & Boles: ENGINEERING THERMODYNAMICS, TMH
Sonntag: FUNDAMENTALS OF THERMODYNAMICS, Wiley India Pvt. Ltd.
Van Wylen: FUNDAMENTALS OF CLASSICAL THERMODYNAMICS, John Wiley & Sons.
J.P. Holman: THERMODYNAMICS, McGraw Hill.
P.K. Nag: ENGINEERING THERMODYNAMICS, TMH.
Onkar Singh: ENGINEERING THERMODYNAMICS, New Age International Publication.
R.K. Rajput: THERMAL ENGINEERING, Laxmi Publication.
C.P. Arora: ENGINEERING THERMODYNAMICS.

Course Number: MEM202, Course Title: ENGINEERING MECHANICS I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem: 52

UNIT 1: REVIEW
Vector. Unit vector. Components of a vector. SI units and their notations. Concurrent force system. Resultant & equilibrant.
GENERAL FORCE SYSTEM: Moments of a force and of a couple. Resultant of a coplanar force system. Single force equivalent. Resultant of a general force system. Wrench. Free body diagram. Equilibrium of a rigid body. Static indeterminacy.
UNIT 2: STRUCTURES
Trusses. Method of joints. Method of sections. Force analysis of frames and machines.
DISTRIBUTED FORCES: Gravitational forces. Surface loadings.
UNIT 3: STATICS OF LIQUIDS
Hydrostatic pressure. Centre of pressure. Bouyancy.
FRICTION: Dry friction. Systems involving sliding or tipping. Wedges. Square threaded screws. Belt friction.
UNIT 4: INTERNAL FORCES
Bending of beams. Differential relationships between rate of loading, Shear Force and Bending Moment. Beams and cantilevers. Shear force, bending moment and axial force diagrams for horizontal beams with concentrated (vertical and inclined), uniformly distributed and uniformly increasing loads and moments. Inclined beams. Beams floating on water.
UNIT 5: VIRTUAL WORK
Principle of Virtual work Potential energy, Stability.
MOMENTS OF INERTIA: Area moments of inertia. Parallel axis theorem. Transformation of axes.

SUGGESTED READING:
Dayaratnam: STATICS
Ginsberg & Genin: STATICS
Shames: STATICS
Meriam: STATICS
Hibler: STATICS

Course Number: MEM203, Course Title: ENGINEERING DRAWING II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2021-22
Total Credits: 3, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem: 39

UNIT 1: JOINTS
Rivets and Riveted Joints, Welded Joints and their Symbols, Bolts and Bolted Joints, Pins and Cotters, Kuckle and Cotter Joints. Screw Threads, Screw and Screwed Fastenings. Pipes and Pipe Joints.
UNIT 2: BEARINGS AND BRACKETS
Shafts, Pulleys, Keys, Shaft Couplings, Simple Bearings, Plummer Block, Wall, Bracket.
UNIT 3: STEAM ENGINE PARTS
Stuffing Box, Cross Head, Connecting Rod and Crank. Eccentric, Slide Valve. (Free Hand Sketching of Various Parts Stated Above)
UNIT 4 & UNIT 5: GRAPHIC STATICS
Representation of Forces using Bow's Notation, Determination of Resultants and Reactions. Application To Coplanar Force Systems Including Frames and Beams. SF and BM Diagrams for Beams and Cantilevers with Concentrated and V.D. Loads. Use of Funicular Polygons.
Exercise of Engineering drawing using SOLIDWORKS.

SUGGESTED READING:
Laxminarayanan & Mathew: M/C DRAWING
Sastry & Prasad: APP. MECHANICS
Perkinson: FIRST YEAR ENGG., DRAWING
Vijayvergiya: M/C DRAWING
Bhatt: MACHINE DRAWING

Course Number: MEM204, Course Title: WORKSHOP PRACTICE II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1.5, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem: 39

MACHINE SHOP
Demonstration of different Machines & Operations: Lathe Machine, Milling Machine, Shaping Machine.
(a) Practice of different operations of Lathe Machine: (1) Facing (2) Tapper Turning (3) Plain Turning (4) Step Turning etc.
(b) Practice of making Vee-block on Shaping Machine on C.I. Casting.
(c) Practice of making different shapes from cylindrical rod on Milling Machine (1) Hexagonal (2) Square (3) Triangular & Practice of Indexing.
SMITHY SHOP
Demonstration of different tools of shop.
Practice of different operations of Smithy Shop-(1) Upsetting (2) Drawing Down (3) Setting Down (4) Bending (5) Revetting.
PATTERN SHOP
Demonstration of pattern shop tools.
Idea of different pattern allowances-(1) Contraction allowance (2) Draft allowance (3) Machining allowance (4) Rapping allowance (5) Distortion allowance.
Practice of a pattern of Vee-block by fixing allowances.

Course: MAM281, Title: ENGINEERING MATHEMATICS II
Class: B. Tech., Status of Course: MAJOR COURSE, Approved since session: 2017-18
Total Credits: 3, Periods (55 mts. each)/week:3(L-3-0+P/S-0), Min pds./sem:39

UNIT 1: DIFFERENTIAL EQUATIONS
Equations of first order and first degree, Linear equations with constant coefficients, Equations of first order but not of first degree, Singular solutions, Orthogonal trajectories.
UNIT 2: TOTAL DIFFERENTIAL EQUATIONS
Simultaneous and Total Differential Equations: Necessary and Sufficient conditions for integrability of the total differential equations, Solution by inspection, Regarding one variable as constant, Homogenous Total Differential Equations, Method of Auxiliary Equations.
UNIT 3: DIFFERENTIAL EQUATIONS OF SECOND ORDER
Ordinary Linear Differential Equations of Second Order: When one integral belonging to C.F. is known, Method of Removal of the first derivative, Transformation of the equations by changing the independent variable, Method of variation of parameters.
UNIT 4: PARTIAL DIFFERENTIAL EQUATIONS
Elementary partial differential equations of first order, Homogenous and non-homogenous partial differential equations with constant coefficents, Solution for wave, heat conduction and transmission equations.
UNIT 5: FOURIER SERIES
Dirichlet's conditions, Half range series, Harmonic analysis.

SUGGESTED READINGS:
Ray and Sharma : Differential Equations Gorakh Prasad: Text Book of Differential Calculus
Chadda GC, Dwivedi D S and Tripathi S M: : Text Book of Differential Calculus
Raddick and Millar: Advanced Mathematics for Engineers.

Course Number: FBM201, Course Title: INDUSTRIAL TRAINING & DEVELOPMENT
Class: B.Tech.-BBA, Status of Course: CORE COURSE, Approved since session: 2001-02
Total Credits:2

Continuous Training on 10 Saturdays.

Course Number: FBM202, Course Title: SEMINAR & GROUP DISCUSSION
Class: B.Tech.-BBA, Status of Course: MAJOR COURSE, Approved since session: 2001-02
Total Credits:2, Periods(55 mts. each)/week: 3(L-0+T-0+P/S-3),Min.pds./sem.:39

Seminar and Group Discussion Course.

Course Number: FBM203, Course Title: BASIC MANAGEMENT
Class: B.Tech.-BBA, Status of Course: ANCILLARY COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. each)/week: 4(L-4+ T-O+P/S-O), Min.pds./sem.: 52

UNIT 1: INTRODUCTION [12 pds]
Nature of Management, Levels of Management, Principles and Importance of Management, Universality of Management.
UNIT 2: PLANNING [10 pds]
Nature, Objects and Importance of Planning, Planning Process, Decision Making.
UNIT 3: ORGANISING [10 pds]
Nature and Importance of Organisation, Organisation Structure, Forms of Organisation Structure.
UNIT 4: DIRECTING [10 pds]
Meaning and Concept of Direction, Principles and Techniques of Direction, Communication and Motivation.
UNIT 5: CONTROLING AND CO-ORDINATING [10 pds]
Meaning and Concept of Controlling, Control Process, Requirement of Effective Control System, Co-ordinating.
SUGGESTED READINGS:
Koontz O'Donnel & Wielrich: ESSENTIALS OF MANAGEMENT Iswar Dayal: NEW CONCEPTS IN MANAGEMENT
RS Dawar: THE PROCESS OF MANAGEMENT Srinivasan: MANAGEMENT PRINCIPLES AND PRACTICE
Banerjee: PRINCIPLES & PRACTICE OF MANAGEMENT Gupta CB: PRINCIPLES OF MANAGEMENT
Peter F Drucker: MANAGEMENT TASKS, RESPONSIBILITIES, PRACTICES GR Terry: PRINCIPLES OF MANAGEMENT

Course Number: FCM201, Course Title: ACCOUNTING FOR ENGINEERS

Class: B.TECH-B.COM., Status of Course: MAJOR, Approved since session: 2016-17
Total Credits: 3, Periods (55 mts. each)/week: 4 (L-4+T-0+P/S-0), Min.pds./sem:52

UNIT 1: OVERVIEW OF ACCOUNTING
Meaning, Objects and Importance of Accounting, Accounting Concepts & Conventions, Double Entry System.
UNIT 2: ACCOUNTING CYCLE
Journal, Ledger, Trial Balance and Subsidiary Books.
UNIT 3: BANK RECONCILIATION STATEMENT, CAPITAL & REVENUE, ACCOUNTS FOR NON-PROFIT ORGANISATIONS
Bank Reconciliation Statement, Capital and Revenue, Receipt & Payment account and Income & Expenditure account.
UNIT 4: DEPRECIATION, PROVISIONS AND RESERVES AND ERRORS
Depreciation: Meaning, Need, Cause and Methods of Providing Depreciation (SLM and WDM) Provisions: Nature Kinds and their creations**,** Errors: Types and their rectifications
UNIT5: PREPARATION OF FINANCIAL STATEMENTS
Trading Account, Profit & Loss Account and Balance Sheet, Adjustments.

SUGGESTED READINGS:
Batliboi JR: ADVANCED ACCOUNTS
Gupta RR: ADVANCED ACCOUNTANCY
Gupta SP & Arjun Das: ADVANCED ACCOUNTANCY
Shukla MC & Grewal TS: ADVANCED ACCOUNTS
Shukla SM: ADVANCED ACCOUNTANCY
Gupta RL: ADVANCED ACCOUNTS

Course Number: FCM202, Course Title: BUSINESS STATISTICS
Class: B. TECH-B.COM., Status of Course: MAJOR, Approved since session: 2016-17
Total Credits: 3, Periods (55 mts. each)/week: 3 (L-3+T-0+P/S-0), Min.pds./sem:39

UNIT 1: INTRODUCTION
Meaning, Definition, Scope and Limitations of Statistics, Functions and Importance of Statistics, Statistical Enquiry: Census and Sample methods of Enquiry, Planning for Statistical Enquiry.
UNIT 2: STATISTICAL DATA
Statistical Data: Primary and Secondary Data, Methods of Collection, Classification, Editing and Approximation, Statistical Errors: Meaning, types and causes, Presentation of Data: Tabular, Diagrammatic and Graphic presentation of data.
UNIT 3: CENTRAL TENDENCY
Arithmetic Average (Simple and Weighted), Combined Average, Geometric and Harmonic Mean, Mode, Median, Quartiles, Deciles and Percentiles.
UNIT 4: DISPERSION AND SKEWNESS
Range, Quartile Deviation and Mean Deviation, Standard Deviation and Coefficient of Variation, Measures of Skewness.
UNIT 5: CORRELATION
Correlation: Meaning, Types, Degrees and uses, Karl Pearson's Coefficient of Correlation, Spearmen’s Coefficient of Correlation, Concurrent Deviation method of Correlation.

SUGGESTED READINGS:
Elhance DN: Fundamentals of Statistics
Gupta BN: Statistics
Varshney RD: Fundamentals of Statistics
Gupta SP: Statistical Methods
Nagar KN: Fundamentals of Statistics
AL Nagar: Basic Statistics

Course Number: FCM203, Course Title: SEMINAR & GROUP DISCUSSION
Class: B. TECH-B.COM., Status of Course: MAJOR, Approved since session: 2016-17
Total Credits: 2, Periods (55 mts. each)/week: 4 (L-4+T-0+P/S-0), Min.pds./sem:52

Students are required to present one seminar paper in each major paper for internal evaluation. In addition to this he is allotted one more topic for presentation in external seminar for end semester evaluation.

Course Number: ABH281, Course Title: PRINCIPLES OF ECONOMICS
Class: B.Tech., Status of Course: ANCILLARY COURSE, Approved since session: 2017-18
Total Credits:3, Periods(55 mts. each)/week:3(L-4+T-0+P/S-0), Min.pds./sem.:39

UNIT 1: INTRODUCTION [5 pds]
(a) Definition and Scope of Economics (b) Nature of Economic Laws.
UNIT 2: CONSUMPTION [9 pds]
(a) Meaning and Importance of Consumption (b) Characteristics and Classification of Wants (c) Utility, Concepts, Marshallian & Hicksian approach (d) Demand - Laws and Elasticity of Demand.
UNIT 3: PRODUCTION [9 pds]
(a) Meaning of Production, Factors of Production (b) Meaning, Characteristics and Efficiency of Factors of Production (c) Malthusian and Optimum Theories of Population, Localisation of Industries (d) Laws of Return.
UNIT 4: EXCHANGE AND DISTRIBUTION [8 pds]
(a) Market-Meaning and Classification (b) Extent of Market (c) Price Equilibrium (elementary) (d) Concept and Theories of Distribution (elementary).
UNIT 5: PUBLIC FINANCE [8 pds]
(a) Definition Scope and Importance of Public Finance (b) Private and Public Finance (c) Tax Structure: An overview, Taxation in India (d) Budget-An overview, Budgetary process in India.

SUGGESTED READINGS:
KK Dewett: MODERN ECONOMIC THEORY
KPM Sundharam: TEXT BOOK OF ECONOMIC THEORY
HS Agrawal: PRINCIPLES OF ECONOMICS
DP Gautam: PRINCIPLES OF ECONOMICS
VC Sinha: PRINCIPLES OF ECONOMICS
Kotsoyiannis A: MODERN MICRO ECONOMICS

Course Number: BBH281, Course Title: BUSINESS ORGANISATION
Class: B.A.(SS), Status of Course: ANCILLARY COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. each)/week: 4(L-4+ T-O+P/S-O), Min.pds./sem.: 52
[SAME AS BBH101/BAH231/251/291]
UNIT 1: INTRODUCTION [10 pds]
Nature, Object, Meaning and Importance of Business Organisation. Social Responsibilities of Business. Functions of Business Organisation.
UNIT 2: FORMS OF BUSINESS ORGANISATION [10 pds]
Factors Determining the Forms of Business Organisation, Sole Proprietorship, Partnership.
UNIT 3: JOINT STOCK COMPANIES [15 pds]
Definition, Kinds, Formation, Management, Meetings & Winding up.
UNIT 4: ADVERTISING [10 pds]
Meaning, Object and Advertising Media, Importance of Advertisement and Advertisement Copy.
UNIT 5: STOCK & PRODUCE EXCHANGES [7 pds]
Meaning, Functions, Importance and Control of Stock & Produce Exchanges.

SUGGESTED READINGS:
Bhushan YK: BUSINESS ORGANISATION & MANAGEMENT Shukla MC: BUSINESS ORGANISATION & MANAGEMENT
Sharlekar SA: MODERN BUSINESS ORGANISATION AND MANAGEMENT
Jagdish Prakash: BUSINESS ORGANISATION AND MANAGEMENT
Agarwal RC: BUSINESS ORGANISATION AND MANAGEMENT (HINDI)
Mehrotra HC & Gupta BS: BUSINESS ORGANISATION AND MANAGEMENT (HINDI)
Bhushan YK: BUSINESS ORGANISATION AND MANAGEMENT (HINDI) Gupta CB: BUSINESS ORGANISATION

Course Number: ENH281, Course Title: ENGLISH II
Class: B.Tech., Status of Course: NF ANCILLARY COURSE, Approved since session: 2009-10
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: Developing Narrative Skills, Situational Writings, and Consultation of Dictionary.
UNIT 2: Correction of Errors related to various parts of Speech.
UNIT 3: Various Concepts and How to express them (7-10 concepts to be covered).
UNIT 4: Vocabulary building process through various sources
UNIT 5: Commonly used Idioms and Phrases.

Course Number: HSH281, Course Title: HOUSEHOLD MANAGEMENT
Class: B.Tech., Status of Course: NF ANCILLARY COURSE, Approved since session: 1998-1999
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39

UNIT 1 [8 pds]
(a) Functions of food: (i) physiological (ii) social (iii) psychological (b) Food group prescribed by ICMR (c) Meal management for the family.
UNIT 2 [8 pds]
Functions sources, requirements and deficiency of: (a) Carbohydrates (b) Proteins (c) fats (d) vitamin A, D, E, K (e) B complex and vitamin C (f) Iron and calcium.
UNIT 3 [8 pds]
(a) Behaviour problems of childhood (b) Parent-Child relationship (c) Discipline (d) Immunization for the child.
UNIT 4 [8 pds]
(a) Process of decision making (b) Budget making (c) Stages of family life cycle.
UNIT 5 [7 pds]
(a) Selection of draperies and linen (b) Care and storage of garments dry cleaning.
SUGGESTED READINGS:
Moorthy Gayatri: FOOD AND NUTRITION
Devdas RP: A TEXTBOOK ON CHILD DEVELOPMENT Hurlock EB: CHILD DEVELOPMENT
Nickell & Dosey: A MANAGEMENT FOR FAMILY LIVING
Deulkar Durga: A GUIDE TO HOUSEHOLD TEXTILE AND LAUNDARY WORK

Course Number: MUH281, Course Title: SANGEET KRIYATMAK II
Class: B.Tech., Status of Course: NF ANCILLARY COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem.: 39

UNIT 1: Introduction to swar/Taal vadya-Baithak
UNIT 2: Sargam evam Alankar
UNIT 3: Playing/Singing of Dhun/Geet
UNIT 4: Playing/Singing of Prayer
UNIT 5: Playing/Singing of University Song

Course Number: OMH201, Course Title: COMMUNICATION TECHNIQUES HINDI II
Class: B.Tech., Status of Course: ANCILLARY COURSE, Approved since session: 2009-10
Total Credits: 3, Periods (55 mts. each)/week: 3 (L-3+T-0+P/S-0), Min.pds./sem: 39

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Course Number: SYH281, Course Title: SOCIOLOGY OF SCIENCE
Class: B.Tech., Status of Course: ANCILLARY COURSE, Approved since session: 2001-02
Total Credits: 3, Periods (55 mts. each)/week: 3(L-3+T-0+P/S-0), Min.pds./sem.: 39

UNIT 1 [7 pds]
Sociology & Social Engineering-Meaning, Nature and Scope.
UNIT 2 [9 pds]
Basic Concepts-Society, Community, Association, Institution, Social Groups: Meaning & Classification.
UNIT 3 [7 pds]
Concepts: (a) Social Ecology (b) Rural and Urban. Community: Concepts. Social Structure: Concepts.
UNIT 4 [7 pds]
Science & Technology and social change.
UNIT 5 [9 pds]
Society and Values: Meaning of Values, types of Values and their importance.

SUGGESTED READINGS:-
TB Bottomore: SOCIOLOGY
RM Maclver & CH Page: SOCIETY
AR Desai: RURAL SOCIOLOGY IN INDIA
CN Shankar Rao: SOCIOLOGY
Guha Ram Chandra (Ed.): SOCIAL ECOLOGYSachadeva & V Bhushan: AN INTRODUCTION TO SOCIOLOGY
Elliot & Merrill: SOCIAL DISORGANISATION

Course No.: ACH231/251/291/281, Course Title: FUNDAMENTALS OF ACCOUNTING
Class: B.Tech., Status of Course: NF Half Course, Since session: 2017-18
Total Credits:3, Periods(55 mts. each)/week:4(L-4+T-0+P/S-0), Min.pds./sem.:52

UNIT 1: OVERVIEW OF ACCOUNTING [12 pds]
Meaning, Objects and Importance of Accounting, Accounting Concepts & Conventions, Double Entry System.
UNIT 2: ACCOUNTING PROCESS I [10 pds]
Journal, Ledger, Trial Balance and Subsidiary Books.
UNIT 3: BANK RECONCILIATION STATEMENT, CAPITAL & REVENUE [10 pds]
Bank Reconciliation Statement, Capital and Revenue, Provisions and Reserves. Depreciation (Fixed Installment Method, Written Down Value Method)
UNIT 4: PREPARATION OF FINAL ACCOUNTS [10 pds]
Trading Account, Profit & Loss Account and Balance Sheet, Adjustments.
UNIT 5: FINAL ACCOUNTS WITH ADJUSTMENTS [10 pds]
Preparation of Final Accounts (with Adjustments)

SUGGESTED READINGS:
Batliboi JR: ADVANCED ACCOUNTS
Gupta RR: ADVANCED ACCOUNTANCY
Gupta SP & Arjun Das: ADVANCED ACCOUNTANCY
Shukla MC & Grewal TS: ADVANCED ACCOUNTS
Shukla SM: ADVANCED ACCOUNTANCY
Gupta RL: ADVANCED ACCOUNTS
Saxena & Saxena: UNIFIED FINANCIAL ACCOUNTING

Course Number: ZOH281, Course Title: BASICS OF NEUROSCIENCE
Class: B.Tech, Status of Course: N.F. ANCILLARY COURSE, Approved since session: 2016-17
Total Credits: 3, Periods(55 mts. each)/week: 3(L-3+T-0+P/S-0),Min.pds./sem.:39

UNIT 1: INTRODUCTION TO NEUROSCIENCE [7 pds]
(a) Historical perspectives of neuroscience (b) Neuroanatomy: Central Nervous System (CNS), Peripheral Nervous System (PNS), Autonomic Nervous System (ANS), Spinal cord.
UNIT 2: THE NERVOUS SYSTEM- AN INTRODUCTION [8 pds]
(a) Introduction to the structure and function of the nervous system; Cellular components: Neurons, Neuroglia (b) Neuron doctrine; The prototypical neuron- axons and dendrites as unique structural components of neurons (c) The ionic bases of resting membrane potential; The action potential, it's generation and properties (d) The action potential conduction.
UNIT 3: ION CHANNELS AND NEUROTRANSMITTERS [8 pds]
(a) Ion channels (b) Different types of neurotransmitters- catecholamines, amino acidergic and peptidergic neurotransmitters (c) transmitter gated channels; G-protein coupled receptors and effectors (d) Neurotransmitter receptors; Ionotropic and metabotropic receptors.
UNIT 4: CELLULAR AND MOLECULAR NEUROPHYSIOLOGY [8 pds]
(a) Molecular and cellular approaches used to study the CNS at the level of single molecules; Synapse: Synaptic transmission, types of dynapses, Synaptic function (b) Principles of chemical synaptic transmission (c) Principles of synaptic integration (d) EPSPs and IPSPs (e) Ion channels (f) Neural transmission.
UNIT 5: TECHNIQUES TO STUDY BRAIN [8 pds]
(a) Sensory systems (b) Molecular basis of behavior including learning and memory; Types of memory with reference to Artificial Intelligence (AI) (c) Neuroimaging techniques e.g. MRI, fMRI, PET scan and EEG (d) Molecular pathogenesis of pain (e) Neurodegenerative diseases e.g. Parkinson's, Alzheimers, Huntington's, psychological disorders and addiction.

SUGGESTED READINGS:

Dale Purves et al: NEUROSCIENCE. 5th Ed (2012). Sinauer Associates Inc.
Eric R. Kandel et al: PRINCIPLES OF NEURAL SCIENCE. 5th Ed (2012). Elsevier
Scanlon & Tina Sander. ESSENTIALS OF ANATOMY AND PHYSIOLOGY. 5th Ed (2012). F.A. Davis Company
Frank Amthor. NEUROBIOLOGY FOR DUMMIES. 1st Ed (2014). For Dummies, A Wiley Brand

Course No.GKC281, Title: SC.METH. G.K. & CURRENT AFFAIRS II
Class: B.Tech., Status: Core Course, Approved since session: 2004-05
Total Credits: 1, Periods(55 mts. each)/week:1(L-1+ T -O+P/S-O), Min.pds./sem. :13
UNIT 1: POLITICAL SCIENCE-INDIA
Constitution-preamble, citizenship, fundamental, rights, Distribution of powers, General elections, Mode of amendments, Some important amendments, President, Prime Minister and their tenure, salary, powers etc., Defence Forces and Awards.
UNIT 2: POLITICAL SCIENCE
INDIA-Important Indian Political Parties and their symbols, Important Indian Newspapers.
WORLD-United Nations Organisation - its main organs, specialised agencies of UNO, major blocks, treaties, alliances, conferences and associations.
UINT 3: ECONOMICS-INDIA
Some basic economic facts, Five Year Plans, Industrial developments, Principal industries, Industrial Financial Institutions.
UNIT 4: ECONOMICS-WORLD
Important internationals monetary organisations, Currencies of different countries, Glossary of economic terms.
UNIT 5: ENVIRONMENTAL STUDIES-ECO SYSTEM & BIODIVERSITY
(a) Ecosystem - Concept, Structure and Function, Energy Flow in the Ecosystem, Food Chain, Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem (b) Biodiversity and its Conservation - Introduction, genetic species and Ecosystem Diversity, Value of Bio-diversity, India as a Mega-Diversity Nation, Hot-spots of Biodiversity, Threats to Biodiversity, Endangered and Endemic Species in India, Conservation of Biodiversity.

SUGGESTED READING:

NCERT: TEXT BOOKS ON HISTORY, GEOGRAPHY, CIVICS
MANORAMA YEAR BOOK
MR Agarwal: GENERAL KNOWLEDGE DIGEST
NEWS PAPAERS AND MAGAZINES:
HINDI & ENGLISH DAILY NEWS PAPERS
INDIA TODAY
COMPETITION MASTER
SPORTS STAR
COMPETITION SUCCESS REVIEWS
YOJNA

Course Number: RDC281, Course Title: AGRICULTURAL OPERATIONS II

Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem: 26

Different types of crops and crop classification according to different seasons.
Irrigation. Different methods. Weed classification and control. Pesticides and pest control.

Course Number: RDC282, Course Title: SOCIAL SERVICE
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2(L:2+T:0+P:0+S:0), Min.pds./sem: 26

The students are exposed to social service and youth activities in and around the campus to inculcate social upliftment through dignity of labour and moral values.

Course Number: CAC281, Course Title: CO-CURRICULAR ACTIVITIES
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem: 26

Participation by the students in sports and games, literary, social, cultural and professional activities is compulsory. The proficiency attained in them is evaluated every year and counted in the assessment of the overall performance of the student to encourage a balanced and all-round development of their personality.

Course No.: ESC281 Course Title: ENVIRONMENTAL STUDIES
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2018-19
Total Credits:2, Periods(55 mts. each)/week:2(L-2+T-0+P/S-0), Min.pds./sem.:26

UNIT 1: INTRODUCTION TO NATURAL RESOURCES
Introduction to natural resources (soil, water, air, flora and fauna).
UNIT 2: ECOSYSTEMS
Structure and function of an ecosystem. Different types of ecosystems (Forest, Grassland, Desert, Aquatic etc.), Ecological succession , Food chain, Food Webs, Ecological pyramids.
UNIT 3: BIODIVERSITY AND ITS CONSERVATION
Value of biodiversity. India as a mega-biodiversity Nation. Threats to biodiversity. Methods of conservation of biodiversity.
UNIT 4: DEGRADATION OF NATURAL RESOURCES
Overexploitation, soil, water and air pollution, waste generation. Remediation and management of degraded soil.
UNIT 5: ENVIRONMENT AND SOCIAL ISSUES
Environmental ethics. Human population and Environment and Human health Status report on environmental issues related to natural resource management and socio-economic conditions.
SUGGESTED READINGS:
Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India
Heywood, V. H & Watson, R. T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.
Jadhav, H & Bhosale, V. M. 1995. Environmental Science Protection and Laws. Himalaya Pub. House, Delhi 284 p.
Odum, E. P. 1971. Fundamentals of Ecology. W. B. Saunders Co. USA, 574p
Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science
Wanger K. D., 1998 Environmental Management. W. B. Saunders Co. Philadelphia, USA 499 p.

Course Number: EEH291, Course Title: GENERAL ELECTRICAL ENGINEERING
Class:B.Tech.,Status of Course: Non-Faculty ANCILLARY COURSE, Approved since session: 1991-92
Total Credits: 3, Periods (55 mts. each)/week: 3 (L-3+T-0+P/S-0), Min.pds./sem.: 39

UNIT 1: FUNDAMENTAL LAWS OF ELECTRICAL ENGINEERING
Coulomb's law, Ampere's law, Faraday's laws of Electro-magnetic Induction. Kirchoff's laws. Concepts of voltage, current, power and energy.
UNIT 2: CIRCUIT PARAMETERS
Resistance, inductance, capacitance. Series and parallel connections of R, L, & C and associated problems.
UNIT 3: EFFECT OF ELECTRIC CURRENTS
Chemical effect. Heating effect. Electro-magnetic effect. Batteries. Cells. Electro-plating. Resistance in electrical appliances. Electric ovens and furnaces. Electric welding.
UNIT 4: ELECTRO-MECHANICAL ENERGY CONVERSION
General principles of electro-mechanical energy conversion. Motors, Generators and converters of energy. Different types of DC and AC generators and motors with their characteristics and applications.
UNIT 5: POWER GENERATION
Principles of generation of Hydro-Power and Nuclear Power.

SUGGESTED READINGS:-
ML Soni: TECHNICAL ELECTRICITY
Del Toro: PRINCIPLES OF ELECTRICAL ENGINEERING

Course Number: MEH291, Course Title: GENERAL MECHANICAL ENGINEERING
Class:B.Tech.,Status of Course: Non-Faculty ANCILLARY COURSE, Approved since session: 1991-92
Total Credits: 3, Periods (55 mts. each)/week: 3 (L-3+T-0+P/S-0), Min.pds./sem.: 39

UNIT 1
Principles of Simple Machines: Ideal machine. Friction, lubrication and bearings. Power transmission through gears and belts. Simple lifting machines. Levers used in machines. Efficiency and reversibility.
Engineering Materials and their Processing: Plastics, Wood, Ferrous and non-ferrous metals.
UNIT 2
Techniques of joining metals and non-metals by temporary and permanent fasteners. Annealing and hardening. Surface treatment methods.
Hand tools and Machine tools: General idea of measuring tools and hand tools used in general repair and maintenance. Use of machine tools for basic operations done in the machine shop.
UNIT 3
Hot working and cold working of Metals: Brief study of foundry, forging and press work. Knowledge of forming of engineering materials to fabricate some common articles with their drawings/ sketches.
Sources of Power: Introduction to various sources of power. Conventional and non-conventional energy sources.
UNIT 4
Power Generation System: Various components and working principles of power generating systems using steam engines, steam turbines, internal combustion engines and gas turbines.
UNIT 5
Automobile Engineering: Description and working of different systems of automobile transmission, braking and steering of 4 wheelers and 2 wheelers.
Solar Energy: Utility of solar energy in engineering. Solar flat-plate collectors. Solar cells.

SUGGESTED READINGS:-
BT Ajwani: ELEMENTS OF ENGINEERING
BS Raghuvanshi: WORKSHOP TECHNOLOGY, Vol. I
Patel & Karamchandani: HEAT ENGINES, Vol. I
Kirpal Singh: AUTOMOBILE ENGINEERING

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Course Number: CEM301, Course Title: BUILDING CONSTRUCTION
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.:52

UNIT 1: BUILDING CONSTRUCTION
[11]
Occupancy classification of buildings , General requirements of site and building, Building codes and rules, Licensing of building works. Functional planning of buildings such as residential, institutional, public, commercial and industrial buildings.
UNIT 2: FOUNDATIONS AND MASONRY [10]
Types of foundations, foundations in expansive soil. Selection criteria, Brick masonry, stone masonry, and cement-concrete masonry. Types of walls, partition and cavity walls. Prefabricated construction. Plastering and pointing. Damp proofing materials and techniques, Antitermite treatment.
UNIT 3: FLOORS AND ROOFS [11]
Types floors, construction details and selection criteria Types of roofs and roof covering, treatment for water proofing.
UNIT 4: STAIR AND STAIRCASES [10]
Types, materials, proportions. Doors and windows: sizes and locations, proportions.
UNIT 5: MISCELLANEOUS [10]
Lifts and escalators, AC ducts. White washing, colour washing, painting, distempering. Shuttering, scaffolding and centering. Expansion and construction joints Sound and fire proof construction, light weight construction, I.S. specifications.

SUGGESTED READING:
Arora, S.P. & Bindra, S.P., 'A text book of Building Construction" Dhanpat Rai & Sons, Delhi, 1977.
Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, Delhi,1977.
Kulkarni, C.J., "A text book of Engineering Materials", Ahmedabad book Depot, Ahmedabad, 1968.
Kulkarni, C.J., "A text book of Engineering Construction", Ahmedabad Book Depot, Ahmedabad, 1968.
Kumar Sushil, "Engineering Materials, "Standard Publishers Distributors, Delhi, 1994.
Kumar Sushil, " Building construction", Standard Publishers, Distributors, Delhi, 1994
McKay W.B., "Building Construction, "Vol.1 to 4, Orient Longman Ltd., Hyderabad, Bombay, Madras, Delhi, Vol.1 & 2 -1995, Vol. 3-1996, Vol. 4-1998.
Punmia, B.C., "A text book of Building Construction ", Laxmi Publications, Delhi, Madras, 1987.

Course Number: CEM302, Course Title: CONCRETE&CONSTRUCTION MATERIALS LAB
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:1.5, Periods(55 mts. each)/week:3(L:0+T:0+P:3+S:0), Min.pds./sem.:39

CEMENT
- Normal Consistency of cement,
- Initial & final setting time of cement,
- Compressive strength of cement,
- Fineness of cement by air permeability and sieve analysis,
- Le-chatalier's apparatus and Auto Clave test for Soundness of cement,
- Tensile strength of cement
- Specific gravity Of Cement

BRICKS
- Water absorption,
- Dimension Tolerances,
- Compressive strength,
- Efflorescence,
- Soundness

STEEL
- Physical and mechanical properties of reinforcing steel

Course Number: CEM303, Course Title: FLUID MECHANICS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2021-22
Total Credits:3, Periods(55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.:52

UNIT 1: INTRODUCTION AND FLUID KINEMATICS [8]
Fluid and continuum, Physical properties of fluids, Rheology of fluids. Pressure-density-height relationship, manometers, Lagrangian and Eulerian approaches, Path lines, Streak lines-Stream lines, Stream tubes, Uniform and non-uniform flows, steady and unsteady flows, laminar and turbulent flows, Compressible and incompressible flows, Rotational and irrotational flows, circulation, stream function and velocity potential, source, sink, doublet.
UNIT 2: FLUID DYNAMICS [8]
Application of law of conservation of mass, momentum and energy equation to a control volume, The differential forms of the continuity, momentum and energy equations, Equation of motion, Navier strokes equation, Euler's equation, general energy equation, kinetic head, pressure head and potential head, Bernoulli's equation, integration of Euler's equation to Bernoulli's equation, energy correction factor, Practical applications of Bernoulli's equation, orifice, mouth piece, orifice meter, venture meter, pitot tube. Time of emptying tanks through orifices.
UNIT 3: LAMINAR AND TURBULENT FLOW [8]
Equation of motion for laminar flow through pipes, Navier stokes equation and its application to simple flows,
Couette and Poiseuille flows, pressure drop, transition from laminar to turbulent flow, turbulent flow, types of
turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces.
UNIT 4: PIPE FLOW [8]
Flow through pipes with friction, friction factor, the Darcy-Weisbach equation, Total energy line and hydraulic gradient line, Series, parallel and branching pipes, Moody's diagram, Equivalent Pipe Length, Transmission of power through pipes, Condition for maximum efficiency. Introduction to Pipe Networking.
UNIT 5: BOUNDARY LAYER THEORY [8]
Introduction to boundary layers, displacement thickness, momentum thickness and energy thickness. Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub-layer, separation and its control.

SUGGESTED READING:
S Narasimhan : First Course in Fluid Mechanics , University Press
Som, S.K. & Biswas G.: Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
M M Das : Fluid Mechanics & Turbo machines , Oxford University Press
S.K.Agarwal : Fluid Mechanics & Machinery, TMH
Garde, R.J., " Fluid Mechanics through Problems", New Age International Pvt. Ltd, New Delhi, 2nd Edition.
Hunter Rouse, "Elementary Mechanics of Fluids", John Wiley & Sons. Omc. 1946
I.H.Shames, "Mechanics of Fluids", McGraw Hill, Int. Student, Education, 1988.
Fluid Mechanics by K L Kumar
Vijay Gupta and S.K.Gupta, " Fluid Mechanics and its Applications", Wiley Eastern Ltd, 1984.
Modi, P.N., and Seth, S.H., "Hydraulics and Fluid Machines", Standard Book House, 1989.

Course Number: CEM304, Course Title: FLUID MECHANICS LAB.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2014-15
Total Credits:1.5, Periods(55 mts. each)/week:2 (L:0+T:0+P:1+S:1), Min.pds./sem.:26

1. To verify the momentum equation using the experimental set-up on impact of jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter, venturimeter, and bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
5. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
6. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
7. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.
8. Verification of meta-centric height.

Course Number: CEM305, Course Title: CONSTRUCTION MATERIALS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.:39

UNIT 1: BUILDING MATERIALS
Bricks : Classification, Properties and selection criteria of Bricks, Burning of Bricks, tests for bricks,
Stone: Classification, characteristics of good building stone, common building stones in India,
Lime : IS specifications , Field tests of Building limes,
Timber: Characteristics of good timber, defects in timber, seasoning of timber, tests on timber, plywood,
Bamboo as construction material.
UNIT 2
Mortar: Types, classification and strength, I.S. specifications.
Cement, Manufacture of cement, Different types of cement such as slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties, Tests on Cements.
UNIT 3
Admixtures, Aggregates and Testing of Aggregates: Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties.
Iron and Steel in Civil Engineering: Structural, Reinforcing Bars, Wires.
UNIT 4
Bitumen and bituminous mixes: sources, composition, characterization, various forms, tests on bitumen preparation/ characterization of bituminous mixes, Mix design
UNIT 5
Finishing Materials: Paints, Varnishes, Distemper
Other Materials: Aluminium**,** Glass, Ceramics, Plastics, PVC,
Geotextiles, FRP, Sun mica, laminated board.

SUGGESTED READING:
Arora, S.P. & Bindra, S.P., 'A text book of Building Construction" Dhanpat Rai & Sons, Delhi, 1977.
Jha, J. & Sinha, S.K., "Building Construction", Khanna Publishers, Delhi,1977.
Kulkarni, C.J., "A text book of Engineering Materials", Ahmedabad book Depot, Ahmedabad, 1968.
Kulkarni, C.J., "A text book of Engineering Construction", Ahmedabad Book Depot, Ahmedabad, 1968.
Kumar Sushil, "Engineering Materials, "Standard Publishers Distributors, Delhi, 1994.
Kumar Sushil, " Building construction", Standard Publishers, Distributors, Delhi, 1994
McKay W.B., "Building Construction, "Vol.1 to 4, Orient Longman Ltd., Hyderabad, Bombay, Madras, Delhi, Vol.1 & 2 -1995, Vol. 3-1996, Vol. 4-1998.
Punmia, B.C., "A text book of Building Construction ", Laxmi Publications, Delhi, Madras, 1987.
Singh Surendra, "Engineering Materials,", Konark Publishers Pvt. Ltd. 1994.
Civil Engg. Materials, TTTI Chandigarh, Tata McGraw- New Delhi.

Course Number: EEM303, Course Title: DATA STRUCTURES
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: REVIEW OF C PROGRAMMING [7 pds]
Structures and Files, Algorithms and Introduction to Complexity Analysis, Program Development with step-wise refinement.
UNIT 2: STACKS, QUEUES AND STRINGS [8 pds]
Arrays, Stacks, Queues and Strings.
UNIT 3: LINKED LISTS [8 pds]
Pointers, Linked Lists, Creation, Insertion and other data processing applications.
UNIT 4: TREES AND GRAPHS [8 pds]
Trees, Graphs.
UNIT 5: SEARCHING AND SORTING [8 pds]
Searching and sorting Algorithms and their analysis.

SUGGESTED READINGS:
AS Tannenbaum, Y Langsam, M. Augenstein: DATA STRUCTURES USING C AND C++, 2nd Edition, Prentice Hall.
Mark A Weiss: DATA STRUCTURES AND PROBLEM SOLVING USING C++, 2nd Edition, Addison Wesley.
R Kruse, B. Leung, C Tondo: DATA STRUCTURES AND PROGRAM DESIGN IN C, Prentice Hall.

Course Number: EEM304, Course Title: C PROGRAMMING LAB.
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits: 0.5, Periods (55 mts. each)/week: 1(L:0+T:+P:1+S:0), Min.pds./sem: 13

C Programming Laboratory.
Course Number: MEM301, Course Title: ENGINEERING MECHANICS II

Class: B.Tech., Status of Course: Major Course, Approved since session: 2013-14
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem: 39

UNIT 1: KINEMATICS OF PARTICLES
Cartesian, cylindrical and path coordinates for velocity and acceleration. Relative motion. Translating reference frame.
KINETICS OF PARTICLES: Equations of rectilinear and curvilinear motions in different coordinate systems. Application to system of particles.
UNIT 2: ENERGY PRINCIPLES
Work done by a force. Potential energy. Conservative forces. Principle of conservation of energy. Power and efficiency.
IMPULSE MOMENTUM PRINCIPLE: Linear and angular momentum. Application to system of particles. Problems involving both energy and momentum principles.
UNIT 3: KINEMATICS OF RIGID BODIES: Translation and rotation. Planar motion. Moving reference frame. Differentiation in a moving reference frame. Velocity and acceleration. Angular velocity and angular acceleration.
UNIT 4: KINETICS OF RIGID BODIES
Planar motion. Translation. Rotation. General motion. Energy & momentum principles. Kinetics in 3-D motion, limited to Euler's equations.
UNIT 5: MECHANICAL VIBRATIONS
Degree of freedom. Equations of motion for undamped & damped single degree systems. Vibration of rigid bodies.
CENTRAL FORCE MOTION: Two body problem. Satellite motion.

SUGGESTED READINGS:
Shames: ENGINEERING MECHANICS
Genin Ginsberg: DYNAMICS
Kraige Meriam: DYNAMICS
Sundara Rajan: DYNAMICS

Course Number: MEM302, Course Title: ENGINEERING MECHANICS LAB.
Class: B.Tech., Status of Course: Major Course, Approved since session: 2002-03
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem: 26

1. Friction in Bearings
2. Worm and Worm Wheel
3. Inclined Plane
4. Screw Jack
5. Wheel and Differential Axis
6. Fly Wheel

Course Number: MAM381, Course Title: ENGINEERING MATHEMATICS III
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2009-10
Total Credits: 3, Periods (55 mts. each)/week: 4(L-4-0+P/S-0), Min pds./sem: 39

UNIT 1: LAPLACE TRANSFORMS
Standard Forms, Shifting and Convolution Theorems, Transforms of derivatives. Inverse Laplace Transforms, Laplace transforms of error function, Heavyside Direct Delta Functions, Applications of Laplace Transforms.
UNIT 2: FOURIER TRANSFORMS
Finite and Infinite Fourier Transforms, Fourier Integral Theorem, Inversion Theorem, Applications of Fourier Transforms.
UNIT 3: COMPLEX ANALYSIS
Analytic Function, Cuachy-Reimann Equation, Conjugate harmonic functions.
UNIT 4: COMPLEX ANALYSIS
Integration, Cauchy's Theorem, Cauchy's Inegral Formulae, Taylor's and Lautent's expansions, Zeros and poles.
UNIT 5: COMPLEX ANALYSIS
Residues, Cauchy Residues Theorem, Simple problems in contour integration.

SUGGESTED READINGS:
MD Raisinghania: INTEGRAL TRANSFORMS
Schaum's Series: LAPLACE TRANSFORM
Schaum's Series: COMPLEX VARIABLES

Course Number: ENH381, Course Title: ENGLISH III
Class: B.Tech., Status of Course: NF HALF COURSE, Approved since session: 2009-10

Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: Reading and Listening Comprehension
UNIT 2: Basics and Forms of Technical and Business Communication.
UNIT 3: Precise and Paragraph writing
UNIT 4: Writing of Scientific and Technical Texts
UNIT 5: Essay writing and Expansion

Course Number: EGC381, Course Title: PRODUCT MANUFACTURING PROJECT
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2007-08
Total Credits: 1.5, Periods (55 mts. each)/week: 3 (L:0+T:0+P:3+S:0), Min.pds./sem.: 39
PRODUCT DESIGN: Product development process tools, Product function, Bench marking and engineering specifications. (Evaluation on the above theory will constitute 20% of the total marks)
The students are encouraged to

1. Identify the products for the project.
2. To check the technical feasibility and financial viability of the project.
3. To discuss the above during brain solving session.
4. To prepare utility article as furniture jigs & fixtures. Science and Engineering models for demonstration purpose.

Course Number: EGC382, Course Title: PRACTICAL TRAINING
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits: 2

The students are expected to undergo practical training in different industries allotted to them at different places, in order to acquaint themselves with the various shop floor activities, industrial environment, problems faced in industries. They are required to submit a report on the training and the evaluation through internal and external viva voce.

Course No.GKC351/361/381/, Course Title: SC.METH. G.K. & CURRENT AFFAIRS III
Class: B.Tech., Status: Core Course, Approved since session: 2014-15
Total Credits: 1, Periods(55 mts. each)/week:2(L-2+ T -O+P/S-O), Min.pds./sem. :26

UNIT 1: SCIENCE - Some basic definitions of Scientific terms.
UNIT 2: SCIENCE - Human Physiology and anatomy, Hygiene, Drugs, Diseases, Health Organizations.
UNIT 3: SCIENCE - Information Technology - basic terminology, development in India, Bio-technology - basic terminology, important centres in India and World.
UNIT 4: SCIENCE - Inventions and discoveries, Indian Space Programmes, Atomic energy in India, Research centres and Laboratories in India.
UNIT 5: ENVIRONMENTAL STUDIES-POLLUTION AND DISASTER MANAGEMENT
Definition, Causes, Effects and Control Measures of Air, Water, Soil, Marine, Noise and Thermal Pollution, Radiation Pollution, Nuclear Hazards, Solid Waste Management, Role of an Individual in Prevention of Pollution. Floods, Earthquake, Cyclone and Land Slides.

SUGGESTED READING:

NCERT: TEXT BOOKS ON HISTORY, GEOGRAPHY, CIVICS	MANORAMA YEAR BOOK
MR Agarwal: GENERAL KNOWLEDGE DIGEST	NEWS PAPAERS AND MAGAZINES:
HINDI & ENGLISH DAILY NEWS PAPERS	INDIA TODAY
COMPETITION MASTER	SPORTS STAR
COMPETITION SUCCESS REVIEWS	YOJNA

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Course No: CEM401, Course Title: WATER SUPPLY ENGINEERING

Class: B.Tech., Status of Course: Major Course, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem:52

UNIT 1: SOURCES AND DEMAND
Sources of water and its characteristics, Factors governing the selection of a source of water supply. Water demand, population forecasting methods; basic needs and factors affecting consumption
UNIT 2: WATER QUALITY
Water quality parameters, quality of surface and ground waters: Physical, chemical and bacteriological: pH, colour and odour, solids, nitrogen and phosphorus, chlorides, toxic metals and compounds.
UNIT 3: WATER TRANSMISSION
Concept of service and balancing reservoirs. Transmission of water: Various types of conduits, capacity and
sizes including economical sizes of rising main, water supply pipelines, Laying and Testing, Pipe materials, joints,
appurtenances and valves; leakages and control.
UNIT 4: WATER TREATMENT
Water Treatment : Objectives, unit operations Pre-Treatment : Screening, sedimentation, Efficiency of sedimentation tank, Grit chamber. Primary sedimentation and coagulation, filtration: Slow sand, rapid sand and pressure filters Disinfection: Chlorination, water softening and Ion-exchange process
UNIT 5: DISTRIBUTION NETWORKS
Water Distribution, Methods of distribution, pressure and gravity distribution systems, General design guidelines for distribution system, Hardy - Cross method, equivalent pipe method of pipe network analysis.

SUGGESTED READINGS:
Hammer M.J. and Hammer M.J., Water and waste water Technology, 4th edn, PHI
Davis M.L. and Cornwell, D.A., Introduction to Environmental Engineering, McGraw Hill
McGhee, T.J., Water supply and Sewerage, McGraw Hill
Peavy, H.S., D.R. and Tehobanoglous, G., Environmental Engineering, McGraw Hill

Course No: CEM402, Course Title: HYDRAULICS & HYDAULIC MACHINES
Class: B.Tech., Status of Course: Major Course, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem:52

UNIT 1: INTRODUCTION
Applications of linear impulse momentum equation. Forces on pipe bends. Force exerted by jets on fixed and moving flat plates and curved vanes. Applications of the angular impulse momentum equations to rotodynamic machines. Euler's fundamental equations. Classification of machines. Dimensional Analysis: Units and dimensions. Dimensional homogeneity. Buckingham theorem. Typical non-dimensional parameters. Kinematics and dynamic similarity. Testing. Resistance of floating and immersed bodies.
UNIT 2: HYDRAULIC TURBINES
Classification of turbines. Impulse turbines. Constructional details. Velocity triangles. Power and efficiency calculations governing of Pelton Wheels. Reaction turbines. Francis and Kaplan turbines. Constructional details. Velocity triangles. Power and efficiency calculations. Degree of reaction. Draft tube. Cavitation.
Principles of similarity. Units and specific quantities. Performance characteristics. Selection of water turbines. Thomas cavitation factor.
UNIT 3: PUMPS
Classification. Centrifugal pumps. Vector diagram. Specific speed. Head. Power and efficiency calculations. Model testing. Performance characteristics. Mixed flow and vertical turbine pumps. Reciprocating pumps. Theory. Indicator diagram. Slip. Theory of air vessel, vane and screw pumps. Axial Flow pumps.
UNIT 4: OPEN CHANNEL FLOW
Open channel flow and its classifications, and properties, energy and momentum principles, sub critical and super critical flows. Velocity distribution in open channel - Most efficient channel section, Velocity measurement - Manning’s and Chezy’s formula
UNIT 5: TYPE OF FLOW IN OPEN CHANNELS
Uniform Flow in Open Channels: Specific energy, Critical flow, Channel transitions,
Steady Gradually Varied Flow: Non uniform flow in open channels, gradually varied flow equation, Type of GVF profiles
Steady Rapidly Varied Flow: Hydraulic jump in a horizontal rectangular channel, Specific force, Computation of energy loss.
Unsteady Flow: Celerity of a gravity wave, Positive and negative surges

SUGGESTED READINGS:
J Lal: HYDRAULIC MACHINES
KL Kumar: FLUID MACHINES
Vasandani: FLUID MACHINERY
Crouse: AUTOMOTIVE MACHINES
DS Kumar: FLUID MECHANICS AND FLUID POWER ENGINEERING

Course No: CEM403, Course Title: HYDRAULIC MACHINES LAB
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 0.5, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem:26

Study and sketch of centrifugal pumps and turbines.
1. Testing of 15 H.P. centrifugal pumps.
2. Testing of variable special centrifugal pumps. Determination of coefficient of friction in Disc friction Apparatus.
3. Load test ib Pelton turbine.
4. Muchal curves of Pelton turbine.
5. Load test a Francis turbine.
6. ISI efficiency curves of Francis turbine

Course No: CEM404, Course Title: GEOMATICS-I
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem:52

UNIT 1: INTRODUCTION
Basic concepts of surveying: Objectives; Basic measurements, control networks, locating topographic details; Units of measurement; Error in measurement and their types, indices of precision, weight, outliers; Error sources, types; accuracy and precision, propagation of variance/covariance
Linear measurements: Taping; Optical distance measurement; Electronic distance measurement, classification, and calibration; Errors in distance measurement and precautions
Vertical control: Level surface; Levelling principles, determination of height, leveling instruments; Sources of error and minimization, curvature and refraction effects; closure tolerances; Types of levelling; Characteristics of contours; methods of contouring
UNIT 2: DIRECTION/ANGLE MEASUREMENTS
Concept of direction, azimuth, meridian; Theodolite, fundamental characteristic of theodolite and adjustment, measuring angles, sources of error
Plane Tabling (PT): Accessories in PT, methods of PT, resection methods, preparation of map
UNIT 3: TACHEOMETRIC SURVEYS
Principle and basic system, subtense bar, various types of tachometers, plotting with tachometers
Coordinate systems and datum transformation: Important surfaces in geodesy: earth surface, geoids, MSL, reference ellipsoid; Reference systems: 2D and 3D coordinate systems and transformations; map projection, UTM projection
UNIT 4: CONTROL SURVEYS
Traversing: balancing of traverse, Triangulation, Trilateration, and Triangulateration: Purpose, classification, strength of figure, well-conditioned triangle, triangulation figures, reconnaissance and station selection, inter-visibility of stations, signal and towers, base lining, computation and adjustment in triangulation, satellite station,
Adjustments: Adjustment of errors using Least squares: observation equation and condition equation approach (preferably matrix-based solution)
UNIT 5: TOTAL STATION SURVEYS
Principles, classification, salient features of total station
GPS survey: Principles, errors, DGPS, DOP, GPS survey Methods and plans
Construction surveys: Principle of setting out; Special instruments for setting out: Setting out a building, Setting out a highway curve

SUGGESTED READINGS:
1. Arora, K. R., *Surveying*, Standard Book House, Delhi.
2. Anderson, J.M. and Mikhail, E.M., *Surveying theory and practice,* 7th ed*,* McGraw-Hill 1997.
3. Ghilani, C. D. and Wolf, P. R., *Elementary Surveying: An Introduction to Geomatics*, 13 ed, Prentice Hall, 2011.
4. Schofield, W., *Engineering Surveying*, 6thed, Butterworth Heinemann, Oxford.
5. Sickle, J. V., *GPS for Land Surveyors,* 3rded*.* CRC Press, 2008.
6. Agor, R. "Surveying", Vol. I & II Khanna Publications, Delhi.
7. Arora, K.R., "Surveying" , Vol. I & II Standard Book House, Delhi,
8. Bannister, A. and Baker, R., "Solving Problems in Surveying", Longman Scientific Technical, U.K., 1994.

Course No: CEM405, Course Title: GEOMATICS I LAB
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem:26

1. Visit to Lab. for the study of:
2. a. Maps from Survey of India Publication.
3. b. Conventional Symbol Charts and Different types of maps.
4. To study instruments used in chain surveying and to measure distance between two points by ranging.
5. To determine the bearing of sides of a given traverse using Prismatic Compass and plotting of the traverse.
6. To plot details using radiation and intersection methods in plane tabling.
7. To solve two point / three point problem in plane tabling.
8. To find out the reduced levels of given points using level. (Reduction by Height of Collimation method and Rise and Fall Method).
9. To determine and draw the longitudinal and cross-section profiles along a given route.
10. Practice for temporary adjustments of a Vernier Theodolite and taking Horizontal and Vertical angular measurements, by Reiteration method.
11. Measurement of horizontal angles by Repetition method.
12. Determination of the Tacheometric constants of a given theodilite.

Course No: CEM406, Course Title: BUILDING PLANNING & DRAWING
Class: B.Tech., Status of Course: Major Course, Approved since session: 2019-20
Total Credits: 1, Periods (55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem:39

Experiments:
Drafting of following Using Any CAD software (AutoCAD, Solid Works etc.)
1. Doors, Windows and staircases.
2. Typical site plan and Layout plans of Civil Engineering projects
3. Basic elements and planning residential buildings- method of making line plane and preparation of sheets
4. Detailed drawing of a simple residential masonry building drawing, plan, elevation and sections.
5. Detailed drawing of multi storey framed buildings with stairs.
6. Drawings of public buildings like schools, offices, etc
7. Building service plans (Electrical, Mechanical and Plumbing)

SUGGESTED READINGS:
V.B. Sikka: A course in Civil Engineering Drawing- S.K. Kataria & sons.
M. Chakrabarti: Civil Engineering Drawing
Handbook of concrete, reinforcement and detailing; SP:34(1987)

Course Number: CEM407, Course Title: WASTE WATER ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.:52

UNIT 1: CHARACTERISTICS OF WASTE WATER
Wastewater Characteristics : Physical, chemical and bacteriological examination of water and wastewater: pH, colour and odour, solids, nitrogen and phosphorus, chlorides, toxic metals and compounds, BOD, COD etc. quality requirements, standards of water and waste water, disposal of wastewater on land and water bodies.
UNIT 2: WASTEWATER TREATMENT
Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows Storm water: Collection and estimation of storm water by different formulae.
UNIT 3: DESIGN OF SEWERS
Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, layout and construction of sewer lines, Planning of sewerage systems.
UNIT 4: ADVANCED WASTEWATER TREATMENT
Secondary and tertiary treatment: secondary sedimentation and theory of organic matter removal. Activated sludge process, trickling filters; aerated lagoons, waste stabilization ponds, oxidation ditches, rotating biological contactors (RBC). Anaerobic digestion of sludge: design of low and high rate anaerobic digesters and septic tank. Up flow anaerobic sludge blanket (UASB) reactor and other emerging technologies for wastewater treatment
UNIT 5: SOLID WASTE MANAGEMENT
Solid Waste Management: Sources & classification of solid wastes along with planning & design of its management system; Disposal system. Types of Industrial Waste: Liquid, solid, atmospheric and hazardous, Hazardous wastes.

SUGGESTED READINGS:
1. Davis, M.L. and Cornwell, D.A., "Introduction to Environmental Engineering", McGraw Hill.
2. Masters, G.M., "Introduction to Environmental Engineering and Science", Prentice Hall of India.
3. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G., "Environmental Engineering", McGraw Hill.
4. Arcievala, S.J., "Wastewater Treatment for Pollution Control", Tata McGraw Hill.

Course Number: CEM408, Course Title: TRANSPORTATION ENGG. I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.:52
UNIT 1: HIGHWAY DEVELOPMENT AND PLANNING
Historical Development, road patterns, master plans, road development plans, PMGSY, engineering surveys, highway projects.
UNIT 2: HIGHWAY MATERIALS AND TESTING
Subgrade soil, sub base and base course materials, bituminous materials, testing of soil, stone aggregates and bitumen.
UNIT 3: HIGHWAY GEOMETRIC DESIGN:
Cross section elements, sight distances, horizontal and vertical alignment.
Traffic Engineering: Traffic characteristics, road user & vehicular characteristics, traffic studies, accident studies, traffic operations, traffic control devices, intelligent transport systems, pollution due to traffic.
UNIT 4: DESIGN OF HIGHWAY PAVEMENTS
Flexible pavements and their design, review of old methods, CBR method, IRC: 37-2001, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2002).
UNIT 5: HIGHWAY CONSTRUCTION
Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements.
Highway Maintenance: Various type of failures, evaluation and remedial measures.

SUGGESTED READING:
Khanna, S.K. and Justo, C.E.G., "Highway Engineering", Nem Chand & Bros.
Khanna, S.K. and Justo, C.E.G., "Highway Material Testing Manual", Nem Chand & Bros.
Kadiyali, L.R., "Traffic Engineering and Transportation Planning", Khanna Publishers.
Sharma S.K., "Principles and Design of Highway Engineering", S. Chand & Co.
Papacostas, C.S. and Prevedouros, P.D., "Transportation Engineering and Planning", Prentice Hall.
Jotin Khisty, C. and Kent Lall, B., "Transportation Engineering-An Introduction", Prentice Hall.

Course Number: CEW401, Course Title: REPAIR & MAINT. OF OLD STRUCTURES
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits:2, Periods(55 mts. each)/week: 4(L:0+T:0+P:4+S:0), Min.pds./sem.:40

Maintenance of walls plaster, pouring from ceilings, repair of brick decaying.
Repair of floors, protection from water seeping to the walls.

Course Number: CEW402, Course Title: REPAIR & MAINT. OF CONST. MACHINERY
Class: B. Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits:2, Periods(55 mts. each)/week: 4(L:0+T:0+P:4+S:0), Min.pds./sem.:40

Overhauling of cement-concrete mixture making machine and other such machines used for construction work, general maintenance of masons equipments etc.

Course Number: MEM402, Course Title: MECHANICS OF SOLIDS I
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: STRESS AND STRAIN
Definition of stress. Stress tensor. Stresses in axially loaded members. Strain. Material properties and Stress-strain relations (Constitutive laws). Axial deformation. Compound bars. Thermal Strains.
Transformation of Stress and Strain: Principal stresses. Maximum shearing stress. Mohr's circle. Principal strains. Strain rosettes. Relations between E, K, G and ν.
UNIT 2: TORSION
Torsion of Circular shafts. Torsion formula. Angle of twist. Close coiled helical springs.
Thin Shells of Revolution: Cylindrical and spherical shells. Stress due to internal pressure. Change in volume due to internal pressure.
UNIT 3: BENDING
Review of BM and SF diagrams. Relations between BM, SF and load. Stresses in beams - Flexure formula, Shearing stresses. Stresses in Flitched (reinforced / composite) beams.
UNIT 4: DEFLECTIONS OF BEAMS
Differential equations for elastic beams. Singularity functions. Macaulay's (Direct or Double Integration) method. Mohr's (Area-Moment) method.
Statically Indeterminate Beams: Fixed beams. Propped cantilevers. Continuous beams - Clapeyron's theorem of three moments - determination of support reactions, support moments and deflections.
UNIT 5: COLUMNS & COMPOUND STRESSES
Elastic stability. Euler formula. Different end conditions. Rankine formula, other empirical relations.
Compound Stresses: Stresses in different machine parts subjected to combined internal pressure and bending, twisting and axial loads.

SUGGESTED READING:
Pytel, Singer: STRENGTH OF MATERIALS
Riley, Sturges, Morris: MECHANICS OF MATERIALS
Madhukar A Vable: MECHANICS OF MATERIALS (online)
Gere JM: MECHANICS OF MATERIALS
Shames IH: INTRODUCTION TO SOLID MECHANICS
Popov EP: INTRODUCTION TO MECHANICS OF SOLIDS
Ramamrutham, Narayan: STRENGTH OF MATERIALS
Chandramouli PN: INTRODUCTION TO STRENGTH OF MATERIALS
Rajput: STRENGTH OF MATERIALS

Course Number: MEM403, Course Title: MATERIALS TESTING LAB
Class: B.Tech., Status of Course: Major Course, Approved since session: 2015-16
Total Credits: 1, Periods (55 mts. each)/week: 2 (L:0+T:0+P:1+S:1), Min.pds./sem: 26

List of Experiments.
1. Stiffness test.
2. Sheet metal test.
3. Notch bar test.
4. Brinnel hardness test.
5. Universal testing with UTM
6. Photolastic Bench

Course Number: ENH481, Course Title: ENGLISH IV
Class: B.Tech., Status of Course: NF Half Course, Approved since session: 2009-10
Total Credits: 2.5, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: Writing of Technical Reports and Proposals.
UNIT 2: Notices, Agenda, Minutes, Manuals and Handbooks.
UNIT 3: (a) Research Papers, Articles and Abstracts (b) Review writing.
UNIT 4: Short-Speeches, Debates and Presentation Strategies.
UNIT 5: Oral Presentation- Interviews, Meetings, Seminars, Conferences and Group Discussions (*Students must be exposed to the Practical aspect of Oral Presentation*).

Course Number: ASW401, Course Title: W.E.-METALLURGICAL ANALYSIS
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem.: 26

1. Preparation of standard solutions. Standardization of unknown solutions. Use of different indicators. General methods of analysis. Volumetric, Gravimetric and Instrumental analysis.
2. Estimation of iron in Salt/Ore/Alloy using various reagents: Potassium Permanganate, Dichromate Ceric Sulphate etc.
3. Estimation of Nickel and Chromium in Alloys. Estimation of Copper idometrically. Calorimetric analysis. Potentiometric titrations. Estimation of Copper, Manganese, Iron etc.
4. Estimation of Carbon, Sulphur, Silicon in steel and cast iron. Micro-structure studies of steels.

Course Number: EEW401, Course Title: W.E.-RADIO & T.V. REPAIR
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

INTRODUCTION: Frequency spectrum. Transmission of signal by E.M. waves. Modulation and detection of signals.
SUPERHETERODYNE RECEIVER: Oscillator. Mixer circuit. I.F. stages. Detector and audio stages of a transistor receiver. AGC circuit. Fault detection by signal injection at various points. Tuning a receiver.
TELEVISION: Vestigial sideband and its detection. Bandwidth requirements. The signal components. Synchronization pulses. Basic Receiver block diagram. Study of circuit of various blocks. Tuner, Video-IF stages. Video detector. Videoamplifier. Low and high frequency compensation. Sync and AGC Circuits. Horizontal and Vertical deflection systems. Power supplies. Sound IF amplifier. Audio detector. Antennas. Various faults and locating the detects. Precautions in trouble shooting. Use of pattern generator. Principle of colour TV.

SUGGESTED READING:
CW Coldwell: PRACTICAL TRANSISTOR SERVICING
RG Middleton: TV TROUBLE SHOOTING REPAIR
AN Maini: BASIC TELEVISION
Grob: TELEVISION

Course Number: EEW402, Course Title: W.E.-REPAIR OF ELECTRICAL EQUIPMENT
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

1. Importance of electric energy in day to day life. Brief outline of power generation in India. Concept of voltage, current, power, energy. Home wiring-Components used. Simple test instruments. Fuse. Fault finding and repair. Do's and Don'ts with house wiring.
2. Effects of current: Heating, lighting and Electromagnetic Effects. Heating appliances. Principle. Construction of electric home appliances based upon electric heating. Fault finding and repair.
3. Electric Lighting: Types of bulbs. Shades. Systems of lighting. Emergency light. Electric motors. Types of motors used in industry. Fault finding and repair. Rewinding motors and transformers.

Course Number: EEW403, Course Title: W.E.-PRINTING TECHNIQUES
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 52

1. Screen Printing: Basic Theory. Apparatus. Material. Process. Trouble Shooting. Preparation of Printing Circuit Boards.
2. Photostat: Basic Theory. Apparatus. Materials. Process. Trouble Shooting. Blue Printing and Ammonia Printing: Theory. Materials. Process and Practice.

Course Number: EEW404, Course Title: W.E.- MICRO CONTROLLERS & IOT

Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2017-18
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 52

1. Introduction to Arduino and Shields
2. Introduction to ESP8266 and allied boards
3. Discuss about battery solution, battery life estimation
4. Component selection, Board design, BOM, ordering
5. Assemble & Testing
6. Connection to IOT data logging services

Course Number: MEW401, Course Title: W.E.-AUTOMOBILE ENGINEERING
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

1. To study the chasis of an automobile.
2. To assemble piston and connecting rod.
3. To assemble a piston and connecting rod over the crankshaft of an engine.
4. To study the gear train of an automobile.
5. To study the lubrication circuit of an automobile engine.
6. To study the brake system of an automobile.
7. To study the synchro-mesh gear box of an automobile.
8. To study the differential assembly of an automobile.
9. To study the tyres of an automobile.

Suggested reading:
Audel: AUTOMIBLE GUIDE
Crouse: AUTOMOTIVE MECHANICS
Joseph Hietner: AUTOMOTIVE MECHANICS

Course Number: MEW402, Course Title: W.E.-PHOTOGRAPHY
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

Types of photographic cameras. Principal parts and their functions. Types of shutters and their speeds. Diaphragms. Variation of aperture
Photographic film, its emulsion and speed. Exposure and its determination.
Various types of developers. Techniques of developing and fixing the negatives.
Preparing positives by contact printing and making enlargements of different grades of photographic papers. Various methods of retouching and finishing the negative and positive.
Introduction to Colour Photography: Making colour enlargements from colour negatives.
Special Processes: Micro-photography and photomicrography. Preparing slides by different methods.

Course Number: MEW403, Course Title: W.E.-REFRIGERATION & AIRCONDITIONING
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

List of Experiments
1. Study of Refrigerator and Air-Conditioners.
2. Study of Tools.
3. Gas Welding & Soldering.
4. Detailed study of Compressor.
5. Pipe Techniques.
6. Study of Condensors & Cooling coils.
7. Leak testing.
8. Gas charging.
9. Study of Electrical Circuit.

Course Number: MEW404, Course Title: W.E.-FURNITURE DESIGN & MANUFACTURING
Class: B.Tech., Status of Course: Work Exp. Course, Approved since session: 2000-01
Total Credits: 2, Periods (55 mts. each)/week: 4 (L:0+T:0+P:4+S:0), Min.pds./sem.: 26

General: Principles of wooden and steel tubular furniture.
Manufacture of Wooden Furniture: Different types of joints used. Polishing. Caning. Finishing.
Manufacture of Steel Tubular Furniture: Tube bending. Welding. Spray painting, Caning. Finishing.

Course Number: EGC481, Course Title: INDUSTRIAL VISITS
Class: B.Tech., Status of Course: Core Course, Approved since session: 2000-01
Total Credits: 1

The students of different classes visits various industries to get an exposure to the various operations processes etc. in different types of industries.

Course Number: CAC481, Course Title: CO-CURRICULAR ACTIVITIES
Class: B.Tech., Status of Course: Major Course, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 2 for 26 weeks, Min.pds./sem: 52

Participation by the students in sports and games, literary, social, cultural and professional activities is compulsory. The proficiency attained in them is evaluated every year and counted in the assessment of the overall performance of the student to encourage a balanced and all-round development of their personality.

Course No.GKC431/451/461/481/881, Title: SC.METH. G.K. & CURRENT AFFAIRS IV
Class: BBM/BSSc/BA/BCom/BSc/B.Tech., Status: Core Course, Approved since session: 2004-05
Total Credits: 1, Periods(55 mts. each)/week:1(L-1+ T -O+P/S-O), Min.pds./sem. :13

UNIT 1: LITERATURE
Well known Books and their authors (Indian and Foreign). Foreign Words and phrases in common use. Nobel Prizes.
UNIT 2: INDIAN CINEMA
History and Important Personalities, Academic and other Institutions, Classical Dances of India, Who is Who?
UNIT 3: Abbreviations, Sobriquets, Superlatives
UNIT 4: SPORTS & GAMES
Olympic Games - History, Games Played.
UNIT 5: ENVIRONMENTAL STUDIES-SOCIAL ISSUES
(a) Social Issues and the Environment - From Unsustainable to Sustainable Development, Water Conservation, Rain Water Harvesting, Environmental Ethics, Climate Change, Global Warming (b) Human Population and the Environment - Population Growth, Environment and Human Health, Human Rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health.

SUGGESTED READING:
NCERT: TEXT BOOKS ON HISTORY, GEOGRAPHY, CIVICS — MANORAMA YEAR BOOK
MR Agarwal: GENERAL KNOWLEDGE DIGEST — NEWS PAPAERS AND MAGAZINES:
HINDI & ENGLISH DAILY NEWS PAPERS — INDIA TODAY
COMPETITION MASTER SPORTS STAR COMPETITION SUCCESS REVIEWS — YOJNA

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Course Number: CEM501, Course Title: TRANSPORTATION ENGINEERING-II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: INTRODUCTION, PERMANENT WAY AND COMPONENTS
History and administrative setup of Indian Railways; rail gauges, permanent way – functions, requirements, sections in embankment and cutting (single/double track), electrified tracks, locomotives, wheel and axle arrangement, coning of wheels, components – rails, sleepers, ballast and formation.
UNIT 2: RESISTANCES AND STRESSES IN TRACKS, HAULING CAPACITY
Types of resistances to traction, stresses in different components of track, hauling capacity of a locomotive, tractive effort.
Joints and Fastenings: Types of joints short welded rails, long welded rails and continuous welded rails, rail to rail and rail to sleeper fastenings, elastic fastenings.
UNIT 3: TRACK GEOMETRICS, TURNOUTS AND CROSSINGS
Railway alignment, vertical alignment – gradients and grade effects, horizontal alignment – horizontal curves, super-elevation, concepts of cant excess and deficiency, safe permissible speed, transition curves, widening of gauges and track clearances, points and crossings – terminologies, types of turnouts, design of turnouts, types of crossings, design of crossings.
Track Safety, High speed tracks, Urban railways: Signals classification and their functions, train operation control systems – absolute, automatic block systems, centralized train control system, ATS, interlocking of tracks – principle of interlocking, types of interlocking, high speed tracks - track
requirements, speed limitations, high speed technologies, urban railway - railway systems in urban areas.
UNIT 4: INTRODUCTION, AIRCRAFT CHARACTERISTICS AND AIRPORT SELECTION
Air transport development in India, national and international organizations in air transport, aircraft characteristics and their impact on planning of an airport, selection of site for an airport, airport obstruction, imaginary surfaces, runway orientation clam period and wind coverage.
UNIT 5: GEOMETRIC DESIGNS
Runway and taxiway geometric designs, exit taxiway, its design and fillet curves, runway configuration, separation clearance, design of apron and their layouts.
Airport Traffic control Aids:Visual aids, marking and lighting of runway and apron area, wind and landing direction indicator. Ports and Harbours.

SUGGESTED READINGS:
Chandra, S. and Agarwal, M. M., "Railway Engineering", Oxford.
Arora, S. P. and Saxena, S. C., "A Text Book of Railway Engineering", Dhanpat Rai Publications.
Mundrey, J. S., "Railway Track Engineering", Tata Mcgraw Hill.
Khanna, S. K., Arora, M. G. and Jain, S. S., "Airport Planning & Design", Nem Chand and Bros.
Horonjeff, Robert and McKelvey, Francis X., "Planning & Design of airports', 4th Ed., McGraw Hill.
Saxena, S.C., "Airport Engineering – Planning and Design", CBS Publishers.

Course Number: CEM502, Course Title: STRUCTURAL ANALYSIS – I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: Analysis of statically determinate beams, frames and trusses, deflection of frames and trusses, conjugate beam and area moment theorems; unit load method, strain energy method for slopes and deflections,
UNIT 2: Statically indeterminate structures, static and kinematic indeterminacies, Strain Energy Methods: Castigliano's theorems, theorem of least work, Use of symmetry and antisymmetry, approximate methods for the analysis of building frames
UNIT 3: Analysis of indeterminate structures by flexibility method with application to Trusses, Beams & Frames.
UNIT 4: Column analogy method, analysis of three hinged, two hinged arches.
UNIT 5: Analysis of cables, Unsymmetrical bending and shear centre.

SUGGESTED READINGS:
William F. Riley et al., "Mechanics of Materials", John Wiley & Sons.
Norris, C.H. et.al., "Elementary Structural Analysis", Tata McGraw Hill
Hibbeler, R.C., "Structural Analysis", Pearson Press
Wang, C.K., "Intermediate Structural Analysis", McGraw Hill
Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill

Course No: CEM503 Course Title: STRUCTURAL ANALYSIS I LAB.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 1, Periods (55 mts. each)/week: 2(L:+T:0+P:2+S:0), Min.pds./sem.: 26

List of experiments:

1. To verify the Betti's law.
2. Study of a three hinged arch experimentally for a given set of loading and to compare the results with those obtained analytically.
3. To obtain experimentally the influence line diagram for horizontal thrust in a three hinged arch and to compare the same with the theoretical value.
4. To determine the flexural rigidity of a given beam.
5. To study the behavior of different type of struts.
6. To verify moment area theorem for slopes and deflection of a beams.
7. To find the deflection of a pin-connected truss and to verify the results by calculation and graphically.
8. To determine the carry over factors for beam with rigid connections.
9. To determine the rotational stiffness of a beam when far end is (a) fixed (b) pinned.
10. Determine experimentally the horizontal displacement of the roller end of a two hinged arch for a given set of a loading and to compare the results with those obtained

Course Number: CEM504, Course Title: GEOLOGY AND SOIL MECHANICS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: SOIL FORMATION
Soil types, composition, three phase relations, Physical Properties : Specific gravity, water content, shape and size, grain size distribution curves, relative density, consistency of soils, Unified soil classification system, IS soil classification system, field identification tests,
UNIT 2: COMPACTION
General principles, tests, factors affecting compaction, field compaction, compaction techniques, Capillarity, Permeability : Darcy's law, determination of permeability, equivalent permeability in stratified soils, insitu permeability test, 1-D flow, Laplace's equation, flow nets, seepage, uplift pressure, confined and unconfined flows, piping, filter criteria.
UNIT 3: COMPRESSIBILITY AND CONSOLIDATION
Fundamentals, 1-D consolidation, normally and over-consolidated clays, void ratio – pressure relationships, compressibility characteristics, time rate of consolidation, coefficient of consolidation, curve fitting techniques, settlement, secondary consolidation, 3-D consolidation, vertical sand drains.
UNIT 4: SHEAR STRENGTH OF SOIL
Principle of effective stress, Mohr-Coulomb failure criterion, direct shear test, unconfined compression test, Triaxial shear test : consolidated drained, consolidated undrained, unconsolidated undrained, vane shear test, shear strength of clays and sands, critical void ratio, stress path, pore-pressure coefficient.
UNIT 5: GEOLOGICAL PROCESSES
Rock forming minerals, rock types and their engineering properties
Structural Geology : Dip, strike, faults, folds, joints, their formation and importance in respect of civil engineering structures, rock mass movements, causes of landslides.

SUGGESTED READINGS:
Holtz, R.D. and Kovacs, W.D., "An Introduction to Geotechnical Engineering", Prentice Hall
Couduto, D.P., "Geotechnical Engineering – Principles and Practices", Prentice Hall of India
Ranjan, G. and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age International Publishers
Murthy, V.N.S., "Text Book of Soil Mechanics and Foundation Engineering", CBS Publishers
Lambe, T.W. and Whitman, R.V., "Soil Mechanics", John Wiley and Sons
Das, B.M., "Principles of Geotechnical Engineering", Thomson Asia

Course No: CEM505 Course Title: SOIL MECHANICS LAB
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 1, Periods (55 mts. each)/week: 2(L:+T:0+P:2+S:0), Min.pds./sem.: 26

List of experiments:

1. Determination of water content by oven drying method
2. Determination of specific gravity by pycnometer
3. Determination of field density and dry unit weight by core cutter method
4. Determination of field density by sand replacement method
5. Determination of grain size distribution by sieve analysis
6. Determination of grain size distribution by hydrometer analysis
7. Determination of liquid limit of soil
8. Determination of plastic limit of soil
9. Determination of compaction properties of soil by standard proctor test
10. Determination of shear parameters of soil by direct shear method

Course Number: CEM506, Course Title: CONCRETE TECHNOLOGY

Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16

Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: INTRODUCTION

Definition of concrete, brief introduction to properties of concrete, advantage of concrete, uses of concrete in comparison to other building materials. ingredients of concrete: Properties of Concrete : Compressive strength, tensile strength, stress-strain behavior, modulus of elasticity, shrinkage, creep, characteristic strength, grades of concrete, design stress-strain curve of concrete, reinforcing steel, types and grades, stress-strain behavior, design stress-strain curve.

CEMENT: The chemical ingredients causing changes in properties, situations of use and special precautions in the use of following types of cements: Ordinary Portland cement, rapid handling cement, low heat cement, high alumina cement, blast furnace slag cement, quick setting, white and colored cements, Portland pozzolana cement.

AGGREGATES: Classification of aggregates according to source, size and shape. Characteristic of aggregates: Particle size and shape, crushed and rounded aggregates, surface texture, specific gravity of aggregate; bulk density, water absorption surface moisture, bulking of sand, deleterious material in aggregate, Grading of aggregates, course aggregate, fine aggregate; all in aggregate; finness modulus; interpretation grading charts and combination of two aggregates.

WATER: Lime on the impurities as per IS; effect of excessive impurities an concrete, ascertaining the suitability of water with help of concrete cube test.

PROPERTIES OF CONCRETE: Properties in plastic stage, workability, segregation, bleeding. Properties of hardened concrete: Strength, durability, impermeability, dimensional changes.

UNIT 2: WATER CEMENT RATIO

Hydration of cement, effect of water cement ratios on the physical structure of hydrated cement, water cement ratio law and the conditions under which the law is valid; internal moisture, temperature, age and size of specimen. Definition of cube strength of concrete, relations between water cement ration and strength of concrete.Use of CRRI Charts and BIS cods.

WORKABILITY: Definition, phenomenon of workability, concept of internal friction, segregation and hardness; factors affecting workability; water content; shape, size and percentage of fineness passing 300 micron. Measurement of workability; slump test and compaction factor test; recommended slumps for placement in various condition of placement.

UNIT 3: PROPORTIONING FOR ORDINARY CONCRETE

Object of mix design, strength required for various grades from is 456, proportionate for ordinary mixes prescribed by BIS and its interpretation. Adjustment onsite for: Bulking water contents, absorption, workability, design data's for moisture, bulk, absorption and suitable fine aggregate and coarse aggregate ratio. Introduction to fines concrete.

FORM WORK: Concept of factors affecting the design of form work, materials used for form work, sketches of form work for column, beam and slab, precautions during and after RCC construction, Removal of form work.

UNIT 4: SPECIAL CONCRETES

New materials for light weight concrete, Fly ash, materials for high strength concrete, Accelerators and retarders, air entraining and set controlling agents, water reducing and set controlling agents, special bonding agents. Polymer concrete, cold and hot weather concreting, under water concreting.

UNIT 5: CONCRETE OPERATIONS

Storing of cement in warehouse, at site, effect of storage on strength of cement. Determination of warehouse capacity for storage of cement. Storing of aggregate, Batching of cement, Batching aggregate by volume, using gauge box, measurement of water, mixing, hand mixing, machine mixing– types of mixers. Transportation of concrete, placement of concrete.

COMPACTION: Hard Compaction, pavement, narrow and deep members, machine compaction, types of vibrators, finishing concrete slabs, floating and trowel ling. Curing, objectives, methods of curing, shading concrete works, steam curing, etc. Location of construction joints, treatment of joint before concrete is poured, concreting and expansion joints in concrete in buildings.

SUGGESTED READINGS:

M S Shetty, Concrete Technology: Theory and Practice, S Chand & Company
A M Neville, Concrete Technology, J J Brooks, Pearson Education
P D Kulkarni, R K Ghosh, Y R Phull, Concrete Technology, New Age International Ltd
A R Snthakumar, Concrete Technology, Oxford
M L Gambhir, Concrete Technology, Tata McGraw-Hill Education

Course No: CEM515 Course Title: TRANSPORTATION ENGINEERING LAB
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2019-20
Total Credits: 1, Periods (55 mts. each)/week: (L:0+T:0+P:0+S:0), Min.pds./sem.:

AGGREGATE
- Crushing value and impact value of aggregate,
- Water absorption and Sieve Analysis of Aggregate
- Stripping Value of Bitumen

BITUMEN
- Standard penetration and Water Content Test
- Softening Point and Flash and Fire Point of Bitumen
- Viscosity and Ductility test of Bitumen

BITUMENOUS MIX and Sub Grade soil
- Marshall Stability test
- CBR Test

Course Number: CEM509, Course Title: HYDROLOGY AND GROUND WATER ENGG.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: HYDROLOGY
Hydrology: Hydrologic Cycle. Water Budget Equation, Precipitation: Types, measurements and analysis, error in
estimation, missing data, consistency of rainfall records, Intensity during frequency (IDF) and probabilistic maximum Precipitation (PMP) curves.
UNIT 2: Evaporation: measurement, estimation and control of evaporation,
Evapotranspiration : measurement and estimation, interception and depression storage,
Infiltration : measurement , infiltration indices Flood Routing- Concepts of flow routing, hydraulic and hydrologic routing, Reservoir routing, Channel routing, Muskingum and Muskingum-Cunge methods of channel routing and flood forecasting
UNIT 3: Surface Runoff: Components and factors affecting runoff, methods of estimation of runoff volume and peak runoff, rating curve, Rainfall – runoff relationships Hydrograph analysis: components, factors affecting hydrographs, base flow separation, Direct Runoff Hydrograph, Unit Hydrograph: Theory and assumptions. Derivation of Unit Hydrograph, Synthetic Unit Hydrograph
UNIT 4 : INTRODUCTION AND OCCURRENCE OF GROUND WATER
Ground water utilization & historical background, ground water in hydrologic cycle, ground water budget, ground water level fluctuations & environmental influence Rock properties affecting groundwater, groundwater column, zones of aeration & saturation, aquifers and their characteristics/classification, groundwater basins & springs. Darcy's Law, permeability & its determination, Dupuit assumptions, Ground water flow rates & flow directions, general flow equations through porous media.
UNIT 5: WELL HYDRAULICS AND GROUND WATER INVESTIGATION
Well flow near aquifer boundaries/ for special conditions. Partially penetrating/horizontal wells & multiple well systems, well completion/ development/ protection/ rehabilitation/testing for yield. Pollution and Quality Analysis of Ground Water. Surface/Sub Surface Investigation Methods of Ground Water

SUGGESTED READINGS:
D. K. Todd and L. F. Mays, "Groundwater Hydrology", John Wiley and sons.
K. R. Karanth, "Hydrogeology", TataMcGraw Hill Publishing Company.
S. Ramakrishnan, "Ground water", S. Ramakrishnan.

Course No: CEM510 Course Title: CONCRETE TECHNOLOGY LAB
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2019-20
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem.: 26
CONCRETE
- Compressive strength test
- Slump test
- compaction factor test
- flow table test
- rebound hammer test
- Ultrasonic pulse velocity test
- tensile strength test (concrete and steel)
- flexural test
- Self compacting concrete tests
- Trial mix for mix design

Course Number: CEM511, Course Title: BASIC PRIN. OF ARCHITECTURAL DESIGN
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: Principles of architectural composition – unity, balance, proportion, scale, contrast, harmony, accentuation, restraint, definition, repose, vitality, strength - with the help of illustrations of buildings, both historical as well as contemporary.
UNIT 2: Organizing principles of architectural composition – symmetry, hierarchy, datum, axis, rhythm.
UNIT 3: Different types of spatial organizations of masses – linear, centralized, radial, clustered, grid organization – illustrations of buildings both historical as well as contemporary.
UNIT 4: Use and need of ornament in architectural design – different types of ornamentation in buildings – historical perspective of the use of ornament in buildings.
UNIT 5: Use of different materials like brick, timber, stone, concrete, glass for aesthetic and structural purposes, Style in architecture – basis for classification of styles – evolution of styles.

Course Number: CEM512, Course Title: BASIC ARCHITECTURAL DESIGN LAB
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2015-16
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem.: 26

Course Number: EEM513, Course Title: COMPUTER ARCHITECTURE
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2009-10
Total Credits: 3, Periods (55 mts. each)/week: 5(L:4+T:1+P:0+S:0), Min.pds./sem.: 65

UNIT 1: INTRODUCTION
Evolution of Computers, Stored program concept, Generation of computers, Types of Computer systems. Comparison of various computers, measures for comparison of various systems, performance criteria, problems in specifying performance.
UNIT 2: ARITHMETIC UNIT
Serial and parallel arithmetic unit. Carry look ahead circuits. Realisation of Binary multiplication and division. Algorithms of fast arithmetic operations.
UNIT 3: MEMORY UNIT
Memory device characteristics, Classification and various types of memories and their properties. Concept of memory hierarchy-need and utility. Design of IC RAMs, 2D and 2.5 D memories, Implementation of ROMs. Virtual memory concept. Design objectives. Address mapping. Memory protection schemes. Interleaved memories. Cache Memories – types and organization. Memory management hardware.
UNIT 4: I/O SUBSYSTEM
Addressing of I/O devices, data transfer, synchronisation, interrupt handling, I/O interfaces, I/O channels.
UNIT 5: CPU CONTROL UNIT
CPU organization, Internal structure of the CPU, Register organization, Instruction cycle, Instruction pipelining, Interrupts, processor organization. Microinstructions, Microprogrammed control units, microprogram sequencing, microinstructions with next address field, prefetching of micro-instructions.

SUGGESTED READINGS:
COMPUTER ORGANIZATION AND DESIGN PATTERSON AND HENNESEY: 2nd Edition, Morgan Kaufmann, 1998.
Heuring And Jordan: COMPUTER SYSTEM ARCHITECTURE, Prentice – Hall of India.
W. Stallings: COMPUTER ORGANISATION AN ARCHITECTURE, Maxwell Macmillan International edition.

Course Number: EEM514, Course Title: ADVANCED PROGRAMMING LAB
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2009-10
Total Credits: 1, Periods (55 mts. each)/week: 2(L:0+T:0+P:2+S:0), Min.pds./sem.: 26

1. Write a program in Java to sort strings in ascending order. User should be prompted to enter the input strings.
2. Print a table that lists the values of the powers x^y for all x between 1 and 10 and y between 1 and 8 with all the columns neatly lined up.
3. Write a program in Java to read all the characters of an input file and write them to an output file after capitalizing each character.
4. Use a HashMap to store the names of bank depositors and their current account balances. (Add some entries). Now display all the balances in the hash table along with the depositor's name. Modify the balance of one of your entries and display.
5. Write a Java applet that enables the user to make free hand drawing with the mouse.
6. Write Java applets to draw the following geometric shapes
   (a) a hollow ellipse
   (b) a filled ellipse
   (c) a hollow ellipse in a filled rectangle
7. Write a Java applet that displays a control button and runs as follows. Initially, the label on the button is "Click Me". When the mouse moves from outside and enters the component, the button label changes to "Go Away". When the mouse moves out of the button, the button label changes to "Stay Here". If the button is clicked, then the label is "Clickes".
8. How can parameters be passed to an applet? Pass a string parameter "Hello world" which is to be displayed at the center of the window.
9. Write a Java applet that asks the user to enter numbers from the user and prints the average, smallest and largest of the numbers.
10. Write an applet in Java that displays HAPPY BIRTHDAY continuously. The text should give the illusion to the user that it is continuously moving. Also display 'moving text' in place of 'applet started'.
11. Create a frame in Java that looks like a chess board.
12. Write a Java program to create an applet that contains the following GUI components (i) a **button** with **ok** on it (ii) a **checkbox** labeled as **SHOW** (iii) a **label** with heading **'Name'** (iv) a **list** displaying three items 'itemone', 'itemtwo' and 'itemthree' (v) a horizontal scrollbar (vi) a textfield with text **JAVA** written in it. (vii) A text area of size 5×30 with 'JAVAGUI' written in it.
13. Write a Java applet for loading and displaying an image 'logo.gif' assuming that it is present in your current working directory.
14. Write a Java program for handling mouse events.
15. Write a Java program for creating multiple threads.
16. Write a Java program that lets users create Pie charts. Design your own user interface (Use Swings & AWT)
17. Write a Java program that allows the user to draw lines, rectangles and OU.als.
18. Write a Java program that implements a simple client/server application. The client sends data to a server. The server receives the data, uses it to produce a result, and then sends the result back to the client. The client displays the result on the console. For ex: The data sent from the client is the radius of a circle, and the result produces by the server is the area of the circle.
19. Write a Java program that illustrates run time polymorphism.

Course No.: MAM581, Course Title: DISCRETE MATHEMATICS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2017-18
Total Credits: 3, Periods (55mts. each)/week: 3, Min pds./sem: 39

UNIT 1
Mathematical Logic: Propositions, Connectives, Propositional formulae, Truth Tables, Well formed formulas, Tautologies, Equivalence Formulas; Duality Law: Normal forms: Disjunctive and Conjunctive; Tautological implications: Validity of the arguments, Theory of Inference; Predicate Calculus: Predicates, Variables and Quantifiers, Free and Bounded Variables, Inverse of Discourses.
UNIT 2
Set Theory: Review of basic concepts, Relations, Equivalence relations, Partitions and Equivalence classes, compatibility relations, Partial ordering, Partial Ordering set; Functions: Composition, Inverse, Characteristic functions of a set, Binary and n-ary operations; Natural numbers: Mathematical Induction, Cardinality.
UNIT 3
Groupoid, Monoid, Semigroups, Groups, Subgroups, Normal subgroups, Homomorphism, Cyclic groups, Permutation groups; Lattice: Lattices as posets, some special Lattices, Boolean Algebra; Rings and Fields.

UNIT 4
Combinatorics: Fundamental laws of Counting, Permutations, Combinations, Binomial Theorem, Principle of Exclusion and Inclusion.
UNIT 5
Discrete Numeric Functions, Recurrence relations, Generating functions.
SUGGESTED READINGS:
JP Tremblay, R Manohar: DISCRETE MATHEMATICAL STRUCTURES WITH APPLICATIONS TO COMPUTER SCIENCE, McGraw Hill Publication
CL Lee: DISCRETE MATHEMATICS
Kolman, Busby, Ross: DISCRETE MATHEMATICAL STRUCTURES, Prentice Hall Publication

Course No.: MAM582, Course Title: PROBABILITY AND STATISTICS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2017-18
Total Credits: 3, Periods (55mts. each)/week: 3, Min pds./sem: 39
[Applicable from session 2018-19]

UNIT 1
Conditional Probability, Baye's Theorem; Measure of central Tendency and dispersion in terms of moments. Mathematical expectations.
UNIT 2
Random Variables: Discrete and continuous, Probability mass/ density function, cumulative mass/ density function. Binomial, Poisson and Normal distributions and their applications.
UNIT-3
Sampling distribution, central limit theorem, Estimation; Point and internal estimation using z and t distribution.
UNIT-4
Two types of error, confidence and significance level (small and large samples). Testing of Hypothesis based on means proportions. X^2 – test as the test of independence and goodness of fit. Test based on variance; F-distribution; one way ANOVA.
UNIT- 5
Curve fitting (Method of least square) correlation analysis. Linear regression analysis.

SUGGESTED READING:
Walpole, R.E., Mayers, R.L., Myers, S.L., and Ye K., 'Probability and Statistics for engineers and scientists', Pearson Education.
Johnson, R.A., Probability and statistics for Engineers, PHI.
Kapoor and Saxena, Mathematical Statistics, S. Chand.

Course Number: RDC581, Course Title: AGRICULTURAL ENGINEERING
Class: B.Tech., Status of Course: Core Course, Approved since session: 2015-16
Total Credits: 2.5, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: AGRICULTURAL IMPLEMENTS
Primary and secondary tillage implements. Crop planting and seeding implements. Harvesting equipment. Combines. Special purpose machines like cotton pickers etc.
UNIT 2: FARM POWER & MECHANICS OF FARM TRACTORS
Tractor types. Functions of a farm tractor. Human engineering in tractor design. Traction. Various terms. Traction model. Tread design. Effect of lug and spacing. Radial ply construction.
UNIT 3: GRAIN STORAGE AND DRYING
Equation of motion, Assumptions, Force analysis. Hitches and drawbar.
Post Harvest Engineering: Properties of grain. Theory of grain drying, Effect of different factors in drying process. Deep bed drying. Mass and heat balance in grain drying. Method of grain drying.
UNIT 4: DAIRY ENGINEERING
Milk-its properties. Various processes of milk preservation, viz. Pasteurization and homogenization. Milk Products.
UNIT 5: IRRIGATION ENGINEERING
Concept of infiltration. Irrigation Methods. Border Irrigation. Lacey and Kennedy theory of Irrigation-Channel design. Sprinkler and drip irrigation systems.

Suggested readings:
Michael & Ojha: AGRICULTURAL ENGINERING I & II
Smith: FARM MACHINERY AND EQUIPMENT
Chakraborty & DS De: PHT OF CEREALS AND PULSES
BL John et. al.: TRACTORS AND THEIR POWER UNITS

Course Number: PYH581, Course Title: INDUSTRIAL PSYCHOLOGY
Class: B.Tech., Status of Course: NF Half Course, Approved since session: 2015-16
Total Credits: 2, Periods (55 mts. each)/week: 2(L:2+T:0+P:0+S:0), Min.pds./sem: 26

UNIT 1: NATURE, SCOPE FO INDUSTRIAL PSYCHOLOGY
(a) Nature of Industrial Psychology (b) Industrial Psychology as a Science (c) Applications of Industrial Psychology in Industrial settings (d) Scope of Industrial Psychology
UNIT 2: PERSONNEL SELECTION AND EVALUATION
(a) Methods of Personnel Selection- Interview, Personal Data, Sources of Information about Job candidates (b) General principles of Personnel Testing- Psychological Tests and their uses (c) Human abilities and their measurement.
UNIT 3: ORGANIZATION AND SOCIAL CONTEXT OF HUMAN-WORK
(a) Nature and frame-work of Groups (b) Group-Dynamics and Morale (c) Leadership behavior in Industry (d) Employee-Management relationships: Communication, Participation, Conflicts.
UNIT 4: THE JOBS AND WORK SITUATION
(a) Human factors in Engineering (b) Human factors in Job Design (c) Working Environment [conditions] in Industry: (i) Illumination (ii) Atmospheric Conditions (iii) Noise (iv) Work-Schedule (v) Rest-Pause.
UNIT 5: INDUSTRIAL ACCIDENTS AND HUMAN ERRORS
(a) Accidents- Nature, Definition and their effects (b) Accidents Proneness (c) Causes and Control of Accidents (d) Safety-Devices.

SUGGESTED READINGS:
NF Maier: PSYCHOLOGY IN INDUSTRY
Blum & Nayler: INDUSTRIAL PSYCHOLOGY
MS Vitoles: MOTIVATION AND MORALE IN INDUSTRY
DN Sinha: STUDIES IN INDUSTRIAL PSYCHOLOGY
CS Mayers: INDUSTRIAL RELATIONS IN INDIA

Course Number: EGC581, Course Title: DESIGN ENGG./THEME DEVELOP. PROJECT
Class: B.Tech., Status of Course: Core Course, Approved since session: 2007-08
Total Credits: 1.5, Periods (55 mts. each)/week: 3 (L:0+T:0+P:3+S:0), Min.pds./sem: 39

The students submit projects connected to Design Engineering Concept and Theme development of real life industrial problems. The evaluation in the following topics will constitute 40% of the total marks in EGC581:

1. Design methods, Design process, Identification of need, Design concepts, Design decisions and Development of design.
2. Economics in Engineering Design, Optimization and reliability.

Course Number: EGC582, Course Title: PRACTICAL TRAINING(SURVEY CAMP)
Class: B.Tech., Status of Course: Core Course, Approved since session: 2015-16
Total Credits: 2

The students are expected to undergo practical training in different industries allotted to them at different places, in order to acquaint themselves. The various shop floor activities, industrial environment, problems faced in industries. They are required to submit a report on the training and the evaluation through internal and external viva voce.

Course Number: CRC231/251/261/291/341/581
Course Title: COMPARATIVE STUDY OF RELIGION
Status of Course: CORE COURSE, Approved since session: 2014-15
Total Credits: 2, Periods (55mts. each)/week: 2 (L-2+T-0+P/S-0), Min.pds./sem: 26

UNIT 1: (a) Meaning of the word 'Dharam' and 'Religion'. (b) History of Religion-Scienctific Perspective. (c) Religion, Ethics and Values.
UNIT 2: (a) Pre-Vedic Religion. (b) Concept of Vedic Dieties and Relevance of Yajna. (c) Philosophy of Upanishad. (d) Bhagwadgita in perspective of scientific age. (e) Hinduism-Shaiva, Vaishnav and Shakta (Modern Trends).
UNIT 3: (a) Bhartiya Darshan (Yoga). (b) Jainism-(Modern Trends and Scienctific Perspectives).
(c) Buddhism-(Modern Trends and Scienctific Perspectives).
UNIT 4: (a) Zoroastrianism (b) Judaism (c) Christianity-(Modern Trends and Scienctific Perspectives). (d) Islam and Sufism-(Modern Trends and Scienctific Perspectives).
UNIT 5: (a) Meaning of the word 'Sant' and Contribution of Sant Kabir and Guru Nanak and Tulsi Sahab in Saint tradition. (b) Radhasoami Faith and its Scientific Relevance. (c) (i) Religion and Modern Scientific age. (ii) Religion and future of Mankind.

SUGGESTED READINGS:
LM Joshi & Harbans Singh: AN INTRODUCTION TO INDIAN RELIGIONS
BS Mishra: DISCOURSES ON RADHASOAMI FAITH
Bhagwandas: ESSENTIAL UNITY OF ALL RELIGION
Bhagwandas: SAB DHARAMON KI BUNIADI EKTA
Parashuram Chaturvedi: UTTARI BHARAT KI SANT PARAMPARA
Prabha Sharma: DHARAM-SWAROOP EVEM SANDHARBH
Dayalbagh Educational Institute (DEI): VISHWA KE VIVIDH DHARAM
Ravindranath Tagore: RELIGION OF MAN
GR Singh: & CW Devis: VISHWA KE PRAMUKH DHARAM
KN Tiwari: COMPARATIVE RELIGION
VP Singh: DHARAM EVAM SANSKRITI

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Course Number: CEM601, Course Title: DESIGN OF STEEL ELEMENTS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2021-22
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 39

UNIT 1: INTRODUCTION
Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using rivets, welding, bolting – Design approach, elastic method, limit state design- Design of bolted and welded joints – Eccentric connections - Efficiency of joints.
UNIT 2
Tension members, steel members subject to axial tension. Compression members, struts and columns. Roof trusses, design loads, purlins.
UNIT 3
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base.
UNIT 4
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending, Flange and web splices. ,grillage footings.
UNIT 5
Design of plate girders - Intermediate and bearing stiffeners, Plastic analysis of Beam of Frames.

SUGGESTDED READINGS:
Negi, L.S., "Design of Steel Structures", Tata McGraw-Hill.
B.C. Punmia, A.K. Jain and A.K. Jain, Design of Steel Structures, Laxmi Publishers
3. N. Subramanian, Design of Steel Structures, Oxford University Press
References:
1. IS: 800 : 2007 – Code of Practice for general construction in Steel
2. IS 875 : Part 1 : 1987 (2 Revision), Code of practice for design loads
3. IS 875 : Part 2 : 1987. : Code of practice for design loads (Other Than Earthquake) for buildings and structures
4. SP (1) 1964, Hand Book For Structural Engineers, 1. Structural Steel Sections, Bureau of Indian Standards
5. S.K. Duggal, Limit State Design of Steel Structures, Tata McGraw Hill Book Co.
6. N Subramanian, Code of Practice on Steel Structures- A Review of IS800: 2007, CE & CR 2008. Pp 1-12

Course Number: CEM602, Course Title: IRRIGATION ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Definition of irrigation, Necessity of irrigation, Types of irrigation, Sources of irrigation water. Rain Fall and Run-off: Definition of rainfall and run-off. Catchment area, Dickens' and Ryve's formulae, Types of rain gauges-Automatic and non-automatic, Stream gauging. Water Requirement of Crops: Definition of crop season, Duty,
Delta and Base Period, their relationship, Gross command area, cultivable command area, Intensity of irrigation, Irrigable area, Water requirement of different crops of different crops- kharif and Rabi. Rain Gauge.
UNIT 2: CANAL IRRIGATION
Canal Head works: Definition, object, general layout, functions of different parts of head works, Difference between weir barrage. (ii) Flow Irrigation: Irrigation canals, Perennial irrigation, Different parts of irrigation canals and their functions, Sketches of different canal cross-section. Classification of canals according to their alignment, Design of irrigation canals- Chezy's formulae, Meanings formulae, Kennedy's and Lecey's silt theories and equations, comparison of above two silt theories, critical velocity ratio, Various types of canal lining- Advantages and disadvantages.
UNIT 3: REGULATORY WORKS
Functions and explanation of terms used, Cross and head regulators, Falls, Energy dissipaters, Canal Outlets-different types, Escapes. Cross Drainage Works: Functions and necessity of the following types: aqueduct, siphon, super passage, level crossing, inlet and outlet, Constructional detail of the above.
UNIT 4: UNIT 4: DAMS, WEIRS AND BARAGES
Earthen dams-types, causes of failure, Classification into masonry and concrete dams, Labeled cross section of gravity dam, Spillways-types and uses. (ii) Water Logging and Drainage: Definition, causes and effects, detection, prevention and remedies, Surface and sub-surface drains and their layout. Weir & Barrages.
UNIT 5: TUBEWELL & Lift IRRIGATION

Types of wells- shallow and deep well, aquifer types, ground water flow, construction of open wells and tube wells, Yield of an open/tube well and problems, Methods of lifting water- Manual and mechanical devices, use of wind mills. Introduction, occurrence of ground water, location and command, advantages of tube wells, Tube wells, explanation of terms water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers, Types of tube wells and their choice-cavity, strainer and slotted type: Method of construction boring, installation of well assemble, development of well, pump selection and installation and maintenance.

SUGGESTED READINGS:

S.K.Sharma, Principles & practice of Irrigation Engg.; S. Chand, Limited.
B.C. Punmia, PandeB.B.Lal, Irrigation & Water Power Engg.; Laxmi Publications (p) Ltd
Dr. Bharat Singh Fundamentals of Irrigation Engg.; Nem Chand & Bros
S.R.Sahasrabudhe, Irrigation Engg.& Hydraulic Structure; S. K. Kataria& Sons
Varshney, Gupta & Gupta, Irrigation Engg.& Hydraulic Structure; Nem Chand and Brothers
Santosh Kumar Garg, Irrigation Engg.& Hydraulic Structure; Khanna Publishers

Course Number: CEM603, Course Title: DSGN OF REINFORCED CONCRETE STRUC.I
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. each)/week:3(L:3+T:1+P:0+S:0), Min.pds./sem:39

UNIT 1
Structural concrete- Grades- properties of Concrete- Modulus of elasticity-flexural strength-Characteristic and Design values. Basic Concepts of Reinforced Concrete Design, Introdcution to Design Philosophies, Design of R.C. Beams in Flexure : Singly and doubly reinforced rectangular/flanged sections by Working Stress Method
UNIT 2
Limit State Design Method, Design of R.C. Beams in Flexure : Singly and doubly reinforced rectangular, T-Beams, L-Beams by Limit State Method
UNIT 3
Shear forces in RC Beam, Shear Strength, Design of RC Beam in Shear Development length, anchorage bond and flexural bond, Check for bond resistance Concept of Equivalent Moment and Shear, Design of RC Beam in Torsion
UNIT 4
Design of One and Two way RCC slabs, Effect of edge conditions, Moment of resistance, Torsion reinforcement at corners Design of Staircases
UNIT 5
Design principles of RC columns, Short columns under axial compression, Helical reinforcement, Short Column under uniaxial load and uniaxial bending, Use of Interaction diagrams for Axial load and Moment.

SUGGESTED READINGS:
1. Shah, V.L. et.al., "Limit State Theory and Design of Reinforced Concrete", Structures Publications. , 2007
2. Pillai, S.U. and Menon, D., "Reinforced Concrete Design", Tata McGraw- Hill. 2003
3. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice-Hall. 2002
4. Park, R. and Pauley, T., "Reinforced Concrete Structures", John Wiley. 1976
5. Gambhir, M.L., "Fundamentals of Reinforced Concrete Design", Prentice-Hall of India. 2006

Course Number: CEM604, Course Title: STRUCTURAL ANALYSIS II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Stiffness, flexibility, flexibility and stiffness matrices
Influence Lines: Analysis for different types of moving loads, use of influence line diagrams, application to determinate structures.
UNIT 2: REDUNDANT STRUCTURES
Muller-Breslau principle with application to determinate and redundant structures. Qualitative ILD for continuous beams, frames and arches.
UNIT 3: DISPLACEMENT APPROACH
basic principles. Slope deflection method. Moment distribution method, frame with/without sway, use of symmetry and anti-symmetry.
UNIT 4 : MATRIX METHOD OF ANALYSIS
Basic principles, application to beams, trusses and frames.
UNIT 5: SPACE AND CABLE STRUCTURES
Analysis of Space trusses using method of tension coefficients Suspension cables– suspension bridges with three hinged stiffening girders.

SUGGESTED READINGS:
Wang, C.K., "Intermediate Structural Analysis", McGraw Hill.
Norris, C.H. et.al., "Elementary Structural Analysis", Tata McGraw Hill.
James, M. Gere, "Mechanics of Materials", 5th Ed., Nelson Thornes.
Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
Weaver, W. Jr. and Gere, J.M., "Matrix Analysis of Framed Structures", CBS Publishers.
Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of Structures", Laxmi Publications, 2004

Course Number: CEM605, Course Title: FOUNDATION ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Role of civil engineer in the selection, design and construction of foundation of civil engineering structures, brief review of soil mechanics principles used in foundation engineering.
UNIT 2: SOIL EXPLORATION
Methods of soil exploration; boring, sampling, penetration tests, correlations between penetration resistance and soil design parameters.
UNIT 3: EARTH PRESSURE AND RETAINING WALLS
Earth pressure at rest, active and passive earth pressure, Rankine and Coulomb's earth pressure theories, earth pressure due to surcharge, retaining walls, stability analysis of retaining walls, proportioning and design of retaining walls.
UNIT 4: FOUNDATIONS
Types of foundations, mechanism of load transfer in shallow and deep foundations, shallow foundations, Terzaghi's bearing capacity theory, computation of bearing capacity in soils, effect of various factors, use of field test data in design of shallow foundations, stresses below the foundations, settlement of footings and rafts, proportioning of footings and rafts, sheeting and bracing of foundation excavation.
PILE FOUNDATION: Types and methods of construction, estimation of pile capacity, capacity and settlement of group of piles, proportioning of piles. Well foundations: Methods of construction, tilt and shift, remedial measures, bearing capacity, settlement and lateral stability of well foundation.
UNIT 5: SLOPES
Mode of failure – mechanism, stability analysis of infinite slopes, methods of slices, Bishop's simplified method. Machine Foundations: Types of machine foundations, mathematical models, response of foundation – soil system to machine excitation, cyclic plate load test, block resonance test, criteria for design.

SUGGESTED READINGS:
Ranjan, G. and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age.
Das, B.M., "Principles of Foundation Engineering", PWS.
Som, N.N. and Das, S.C., "Theory and Practice of Foundation Design", Prentice-Hall.
Couduto, Donald P., "Geotechnical Engineering – Principles and Practices", Prentice-Hall.
Peck, R.B., Hanson, W.E. and Thornburn, T.H., "Foundation Engineering", John Wiley.

Course Number: CEM607, Course Title: GEOMATICS II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: PHOTOGRAMMETRY
Photogrammetric terms; type of photographs; mosaics and photomaps; Perspective geometry of near vertical and tilted photographs, heights and tilt distortions; Rectification and orthophotographs; Flight planning; Stereoscopy base lining, parallax equation and stereo measurements for height determination.
UNIT 2: REMOTE SENSING
Introduction to remote sensing, remote sensing system and components; Physics of remote sensing including wave equation and EMR propagation through medium, EMR source characteristics, Role of atmosphere, Physics of EMR interaction with objects, interaction with soil, vegetation, water, snow, rocks, etc.
Sensor characteristics: various resolutions: spectral, spatial, temporal, multi-concept in remote sensing, FOV, IFOV, characteristics of various remote sensing satellites and sensors.
UNIT 3: DIGITAL IMAGE PROCESSING
Concept of digital image; Image processing; interpretation elements, manual versus digital interpretation, Geometric and radiometric distortions in images and their removal, image histogram and histogram manipulation, image convolution, high and low pass filters, directional and non-directional image derivatives; Image classification, unsupervised and supervised-various methods, training data selection, classification accuracy measures-error matrix.
UNIT 4: GEOGRAPHICAL INFORMATION SYSTEM (GIS)
Introduction: Geoinformation and its significance, definition of GIS, overview of application fields, history of GIS.
GIS DATA: Spatial and non-spatial data, spatial data model and significance- raster, tessellation, vector, 2.5D model, spatio-temporal models, hybrid, object oriented; advantages and disadvantages of various models; Topology and topological models; Spatial referencing using coordinates and geographic identifiers, metadata.
UNIT 5: SPATIAL DATA ACQUISITION
Land Surveying, GPS, photogrammetry, LiDAR, GPR, Remote Sensing; Attribute data sources; Spatial data input techniques- digitizing, scanning, georeferencing; Attribute data input; Data storage, RDBMS, database operations.
Spatial data editing functions: Raster-vector conversion, coordinate and projection transformation, data merging methods, data compression; Quality of spatial data, Non-spatial data editing functions.
GIS analysis functions: Retrieval, classification, measurement, neighborhood, topographic, interpolation, overlay, buffering, spatial join and query, connectivity, network functions, watershed analysis, viewshed analysis, spatial pattern analysis, spatial autocorrelation, trend surface analysis.
Applications in Civil Engineering

SUGGESTED READINGS:
Wolf, P, DeWitt, B., and Wilkinson, B., Elements of Photogrammetry with Application in GIS, McGraw-Hill, 2014.
Rampal, K. K., 1982, Textbook of Photogrammetry, Oxford & IBH Publishing Co.
Lillesand, T, M., Kiefer, R, W. and Chipman, J. W., Remote Sensing and Image Interpretation, 5th ed, John Wiley and Sons, 2004.
Rees, W. G., Physical principle of remote sensing, 2nd Edition, Cambridge University Press, 2001.
Schowengerdt, R. A., Remote Sensing: Models and methods for image processing, 3rd ed, Academia Press, 2007.
Jensen, J. R., Introductory digital image processing, 3rd ed, Prentice Hall, 2005.
Campbell, J. B., Introduction to remote sensing, 5thed, Guilford Press, 2011.
Lo, C. P., and Yeung, A.K W., Concepts and techniques of GIS, Prentice Hall of India, 2002
Burrough, P. A., and McDonnell, R. A., Principles of Geographical Information Systems, 2nd ed, Oxford University Press, 1998.
Bossler, John D., Campbell, James B., McMaster, Robert B. and Rizos, Chris, Manual of Geospatial Science and Technology, 2nd ed, CRC press, 2010.
Demers, M. N., Fundamentals of Geographic Information Systems, John Wiley, 3rd ed, 2002
Longley, P. A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., Geographic Information Systems and Science, 2nded, John Wiley, 2005.
Agarwal, C.S. & Garg, P.K., "Remote Sensing in Natural Resources Monitoring and Management", Wheeler Publishing House.
Bossler, J.D., "Manual of Geospatial Science and Technology", Taylor and Francis.
Burrough, P.A. and McDonnell, R.A., "Principles of Geographic Information System", Oxford University Press.
Chandra, A.M. and Ghosh, S.K., "Remote Sensing and Geographical Information Systems", Alpha Science.
Gopi, S., "Global Positioning System: Principles and Applications", Tata McGraw Hill.

Course Number: CEM608, Course Title: GEOMATICS LAB.
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2015-16
Total Credits:1, Periods(55 mts. Each)/week: (L:0+T:0+P:0+S:0), Min.pds./sem.:

Based on the above subject

Course No: CEM611, Course Title: COMPUTER AIDED DSGN. IN CIVIL ENGG.
Class: B.Tech, Status of Course: Major Course, Approved since session: 2014-2015
Total Credits:3, Periods(55 mts. each)/week:3(L:3+T:1+P:0+S:0), Min.pds./sem:39

UNIT 1: GENERAL CONCEPTS & MATHEMATICS PRELIMINARIES
Introduction to Computer Aided Design, Brief history and over view of finite element method, matrices and matrix operation method of solution of simultaneous equations. Shape functions & their derivation. Introduction to boundary value problems and variation calculus.
UNIT 2: DIRECT STIFFNESS METHOD
Introduction to direct stiffness method and its application to springs, electrical networks, flow in pipes and bars. Truss analysis with direct approach. Determination of local element characteristics, assemblage of global element characteristics, application of the prescribed displacements and loads & solution.
UNIT 3: VARIATIONAL FORMULATION
Variational approach to Boundary value problems. The weak formulation. The Euler-Lagrange equation. One dimensional axial deformation and heat conduction problems. Geometric and natural boundary conditions.
UNIT 4: INTRODUCTION TO WEIGHTED RESIDUAL METHODS
Galerkin's approach to one dimensional problems. Completeness requirements, isoparametric elements and concepts of numerical integration.
UNIT 5: APPLICATION TO SOLID MECHANICS
Introduction to theory of elasticity, principle of virtual displacements, plane stress and plane strain problems, Axi-Symmetric and three dimensional stress analysis.
SUGGESTED READINGS:
1. FRANK L. STASA – APPLIED FINITE ELEMENT ANALYSIS FOR ENGINEERS
2. PAUL ALLAIRE – INTRODUCTION TO FINITE ELEMENT METHOD
3. ZINKIEWICZ, O.C – THE FINITE ELEMENT METHOD
4. HUEBNER, K.H. – THE FINITE ELEMENT METHOD FOR ENGINEERS
5. WILLIAM B. BICKFORD – FINITE ELEMENT METHOD
6. DESAI & ABEL – INTRODUCTION TO THE FINITE ELEMENT METHOD

Course No: CEM612, Course Title: CAD LAB
Class: B.Tech, Status of Course: Major Course, Approved since session: 2014-2015
Total Credits:1.5, Periods(55 mts. each)/week:3(L:0+P:2+S:0), Min.pds./sem:39

LIST OF EXPERIMENTS:
Simulation will be performed on STAAD PRO on real life problems.
SUGGESTED READINGS:
1. Krishnamurthy, D., "Structural Design & Drawing – Vol. II and III, CBS Publishers, 2010.
2. Shah V L and Veena Gore, "Limit State Design of Steel Structures" IS800-2007, Structures Publications, 2009
3. STAAD PRO User Manual

Course Number: CEM613, Course Title: DISASTER MITIGATION & PLANNING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: CONCEPT OF DISASTER MANAGEMENT AND MITIGATION
Types of Disasters-causes and impact-hazard and vulnerability assessment-tools and techniques-Pre-disaster mitigation safety management system- Strategies for implementation-Community based Disaster management-Remote sensing and GIS application-Post disaster recovery and rehabilitation
UNIT 2: EARTHQUAKE RESISTANT DESIGN
Introduction to Earthquake-Seismic zones-Major earth quake Case studies-Causes and consequences of Earthquake-Design of Buildings for Earth quake resistance-Structural systems-Seismic design code provision-Design of non-structural elements.
UNIT 3: FLOOD RESISTANT DESIGN
Introduction, Causes and consequences of Flood- Case studies Major Flood prone areas-Flood resistant Designs -Structural systems.
UNIT 4: FIRE RESISTANT DESIGN
Introduction, Causes and consequences of Fire- Case studies of Major Fire prone areas-Fire resistant Designs -Structural systems.
UNIT 5: LANDSLIDE
Introduction, Causes and consequences of Landslides- Case studies of Major Landslide prone areas -Fire resistant Designs -Structural systems.

SUGGESTED READINGS:
DISASTER MANAGEMENT, Global challenges and local solutions, DISASTER MANAGEMENT by GK GHOSH, Training Module on Urban risk mitigation Chandrani Bandhopadhyay, DISASTER EDUCATION AND MANAGEMENT Rajendra Kumar Bhandari, DISASTER SCIENCE AND MANAGEMENT by Tushar Bhattacharya, EARTH AND ATMOSPHERIC DISASTER MANAGEMENT: Nature and Man-made

Course Number: CEM614, Course Title: PRINCIPLES OF TOWN PLAN.& ARCH. LAB
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:1.5, Periods(55 mts. Each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem.: 39

The students are given onsite training and they are exposed to the principles of Dayalbagh town planning and architecture of Dayalbagh which is similar to Danish architecture. Some practical assignments will be given for them to plan a town that is eco-friendly and equipped with sustainable models of energy.

Course Number: EEM611/FEM614, Course Title: DESIGN & ANALYSIS OF ALGORITHMS
Class: B.Tech., Status of Course: MAJOR, Approved since session: 2015-16
Total Credits:3, Total pds.(55 mts each)/week: 3(L:3+T:0+P:0+S:0) Min. pds./sem.: 39

UNIT 1: INTRODUCTION
Algorithms, analysis of algorithms, Growth of Functions, Master Theorem. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.
UNIT 2: ADVANCED DATA STRUCTURES
Red-Black Trees, Augmenting Data Structures. B-Trees, Binomial Heaps, Fibonacci Heaps, Data Structure for Disjoint Sets.
UNIT 3: ADVANCED DESIGN AND ANALYSIS TECHNIQUES
Dynamic Programming, Greedy Algorithms, Amortized Analysis.
UNIT 4: GRAPH ALGORITHMS
Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow, Travelling Salesman Problem.
UNIT 5: SELECTED TOPICS
Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

SUGGESTED READING:
Cormen, Leiserson, Rivest: "INTRODUCTION TO ALGORITHMS", PHI.
Basse, S.: "COMPUTER ALGORITHMS: INTRODUCTION TO DESIGN & ANALYSIS", Addison Wesley.
Horowitz & Sahani, "FUNDAMENTAL OF COMPUTER ALGORITHMS", Galgotia.

Course Number: EEM612/FEM615, Course Title: COMPUTER SCIENCE LAB
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2009-10
Total Credits:1.5, Total pds. (50 mts each)/week: 3(L:0+T:0+P:3+S:0) Min. pds./sem.: 39

Programming assignments on each algorithmic strategy:

1. Divide and conquer method (quick sort, merge sort, Strassen's matrix multiplication).
2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling salesperson problem).
4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).
5. Sorting and Searching: Programming various searching and sorting algorithms.
6. Selection: Minimum/Maximum, kth smallest element.

Course Number: RDC681, Course Title: VILLAGE INDUSTRIES & ENTREPRENEURSHIP
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2015-16
Total Credits:2, Periods(55 mts. each)/week: 3(L:2+T:1+P:0+S:0), Min.pds./sem: 39

UNIT 1: INTRODUCTION
History & Experiments in rural industries. Village industries for prosperity of rural poor. Work of different agencies-KVIC, handicraft & other boards. Small scale industries. Definition. Entrepreneurship motivation. Psychological factors. Development. Industrial Policy.
UNIT 2: ECONOMIC AND MARKET ENVIRONMENT
The economic environment. Scope and opportunities. Selecting a product. Resource based and demand based industries. Market survey and analysis. Product introduction and marketing strategies. Product specifications. Sources and nature of technology of manufacture. Process flow chart. Raw materials. Machinery and tools. Quality standards & control.
UNIT 3: COST OF PROJECT
Cost of project. Fixed and working capital requirement. Cost of production and profitability. Break even analysis. Cash flow analysis.
UNIT 4: FINANCIAL AND CONTROL AGENCIES
Role of Govt. Agencies. Incentives. Backward areas. Reserved items. DIC. SISI. SIDO. National bed banks etc.
UNIT 5: FEASIBILITY
Project feasibility: Preparing a project report. Project implementation.

SUGGESTED READING:
Sinha RK & Sinha Ram: PROJECT ENGG. & MANAGEMENT
Preek Uday & Venkateshwar Rao T: DEVELOPING ENTREPRENEURSHIP: A HAND BOOK
Preek Uday & Venkateshwar Rao T: RURAL PROJECT PLANNING
Chandra Prasanna: PROJECTS, PREPARATION, APPRAISAL, BUDGETING AND IMPLEMENTATION

Course Number: EGC681, Course Title: DESIGN ENGG./THEME DEVELOP. PROJECT
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits:1.5, Periods(55 mts. each)/week: 3(L:0+T:0+P:3+S:0), Min.pds./sem: 39

The students submit projects connected to Design Engineering Concept and Theme development of real life industrial problems.

Course Number: CEC681, Course Title: CULTURAL EDUCATION
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 1999-2000
Total Credits:2, Periods(55 mts. each)/week: 2(L:2+T:1+P:0+S:0), Min.pds./sem: 26

1. Introduction: (a) What is culture (b) Meaning and scope of Indian culture (c) The composite nature of Indian culture.
2. Pre-Vedic Harappan Culture.
3. Indian Literature: (a) Indian language (b) Vedic language (c) Epics & Purans (d) Major authors in classical Sanskrit literature (e) Buddhist literature, Pali Tripitakas, Pali literature (f) Buddhist literature of Mahayan Sutra (g) Jain literature of Agamas (h) Main currents of Bhakti literature.
4. State and Society: (a) Ideals of Kinship (b) Republican traditions (c) Education d) Marriage and family life (e) Varna organisation-Caste system (f) Position of women (g) Religion, state & society.
5. ARTS: (a) Architecture- (i) Stupas and Viharas (ii) Temples (iii) Mosques and Palaces (b) Sculpture and paintings (c) Music and Dance (d) Sports and entertainment (e) Art of warfare.
6. UNITY IN DIVERSITY: (a) Non-Aryan elements (b) West-Asian elements (c) Aryan elements (d) European elements.

SUGGESTED READINGS:

Basham AL: THE WONDER THAT WAS INDIA
Rawlinssion: CULTURAL HISTORY OF INDIA
Stella Kramrisch: INDIAN SCULPTURE
Coomaraswamy AK: HISTORY OF INDIAN & UNCONESIAN ART
Coomaraswamy AK: ARTS & CRAFTS OF INDIA
Percy Brown: INDIAN PAINTINGS
Chatterjee Suniti Kumar: LANGUAGES AND LITERATURE OF MODERN INDIA
V Raghvan: INDIAN HERITAGE
Bishan Swarup: THEORY OF INDIAN MUSIC
Diwakar RD & KM: INDIAN INHERITANCE PT. I TO III
Edward Conze: BUDDHIST SCRIPTURES
Saxena Maheshwar Narain: SANGIT SHASTRA
Ray, Nihar Ranjan: AN APPROACH TO INDIAN ART
Wintarnitz: HISTORY OF INDIAN LITRATURE (3 Vol)
Ramkrishna Mission: CULTURAL HERITAGE OF INDIA
Mocdonell AA: HISTORY OF SANSKRIT LITERATURE
Sahitya Akademi, N.Delhi: CONTEMPORARY INDIAN LITERATURE
Mukerjee RK: SOCIAL FUNCTIONS OF ART
Saxena Ranveer: KALA AUR KALAKAR
Lunia BN: PRACHIN BHARTIYA SANSKRATI
Singh Rajkishore: BHARTIYA KALA AUR SANSKRATI
Upadhyay Baldeo: SANSKRATI SHASTRO KA ITIHAS

Course Number: CAC681, Course Title: CO-CURRICULAR ACTIVITIES
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits:3, Periods(55 mts. each)/week: 2 for 26 weeks, Min.pds./sem: 52

Participation by the students in sports and games, literary, social, cultural and professional activities is compulsory. The proficiency attained in them is evaluated every year and counted in the assessment of the overall performance of the student to encourage a balanced and all-round development of their personality.

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Course Number: CEM701, Course Title: DSGN.OF REINFORCED CONCRETE STRU.II
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2019-20
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1
Structural Behaviour of Footings, Design of Footing For Wall, Design of Isolated Square Spread and Sloped Footing, Combined Rectangular and Trapezoidal Footing
UNIT 2
Structural Behaviour of retaining wall, stability of retaining wall against overturning and sliding. Design of t-Shaped retaining wall, counter fort retaining wall
UNIT 3
Analysis and design of RC framed buildings; Framing systems, member proportioning, loadings, static and dynamic analysis and component design, provisions of ductile detailing.
UNIT 4
Water Tank: Design Criteria, Material Specification, Permissible Stresses, Design of circular and rectangular tanks situated in the ground and overhead water tanks, Introduction to Intz tank
UNIT 5
Pre-stressed concrete; Materials, pre-stressing systems, stress analysis & losses of pre-stress, design of simple beams.

SUGGESTED READINGS:
Jain, A.K., "Reinforced Concrete", Limit State Design, 5th Ed., Nem Chand & Bros. 2006
Krishna, J. and Jain O.P., "Plain and Reinforced Concrete", Vol. 2, Nem Chand and Bros. 1983
Pillai, S.U. and Menon, D., "Reinforced Concrete Design", Tata McGraw-Hill. 2003
Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill. 2005

Course Number: CEM704, Course Title: BRIDGE ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2021-22
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: GENERAL CONSIDERATIONS
Bridges - Components and Classification - Structural Forms - Bridge Aesthetics, Planning of Bridges - Data Collection - Site Selection - General Drawings, Investigation of Bridge - Hydraulic Factors.
UNIT 2: INTRODUCTION TO LOADS
Bridge Loads for Road and Railway Bridges. Influence Lines Diagrams for Loads, Grillage Analysis.
UNIT 3: BRIDGE SUPERSTRUCTURE
Standard specification for Road bridges : Width of carriageway - Clearances, Design of Concrete - Solid Slab Bridge, T-Beam Bridge, Box-Culvert, Courbon's theory, Pigeaud's method, Design of Steel Bridges - Plate Girder
Bridge
UNIT 4: BRIDGE SUBSTRUCTURE AND FOUNDATIONS
Sub Structure: Types of piers and abutments - design forces - Design of piers, wingwalls and abutments.
Bridge bearings: forces on bearings - Basics for selection of bearings - Design of elastomeric bearings - Joints
and their types, Types of foundations - Well foundation -Pile foundations - Detailing (design not included)
UNIT 5: PRESTRESSED AND COMPOSITE BRIDGES
Prestressed bridges- Basic concepts – Advantages – Materials required – Systems and methods of prestressing– Analysis of sections – Stress concept – Strength concept – Load balancing concept (Design not included) Composite Bridges - Shear Connectors

SUGGESTED READINGS:
1. Jagadish T.R. & M.A. Jayaram, "Design of Bridge Structures", 2nd Edition, 2009.
2. Johnson victor D, "Essentials of Bridge Engineering", 7th Edition, Oxford, IBH publishing Co.,Ltd, 2006
3. Ponnu Swamy, "Bridge Engineering", 4th Edition, McGraw- Hill Publication, 2008.
References:
1. Krishna Raju N., "Design of Bridges", 4th Edition, Oxford and IBH Publishing Co., Ltd., 2008
2. Swami Saran, "Analysis and Design of sub-structures",2nd Edition, Oxford IBH Publishing co ltd., 2006.
3. Vazirani, Ratvani & Aswani, "Design of Concrete Bridges",5th Edition, Khanna Publishers, 2006.
4. IRC-24-2001-standardspecifications- code-of-practice-forroad- bridges
5. IRC: 6-2016. Standard specifications and. Code of practice for. Road bridges
6. IRC:5-1998. Standard specifications. And. Code of practice. For. Road bridges
7. IRC:83 (Part-III)-2018 "Standard Specifications and Code of Practice for Road. Bridges"
8. N.KrishnaRaju " Prestressed Concrete Bridges" CBS Publishers 2012

Number: CEM708, Title: SMART BUILDING/INTELLIGENT BUILDING DSGN.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Automation, communication and security; Mechanical, electrical, electronic subsystems and their integration with the building envelope; Environment, energy and sustainability; Configuration and operational characteristics; performance specifications; Analytical models; design methods; case studies.
UNIT 2: MATERIALS IN BUILT ENVIRONMENT
Overview of materials issues in indoor environment as related to the structural and environmental performance of buildings, including organic sources of pollution. Detailed coverage on the materials science of building materials will be covered from not only from the physical and chemical perspective, but also from the performance and pollution perspective. The learned materials science will be illustrated using practical cases studies on structural, thermal and environmental performance.
UNIT 3: INDOOR AIR QUALITY TECHNOLOGY AND MANAGEMENT
Discussion of the various air contaminants in the indoor environment and their transport phenomena, sick building syndrome, building related diseases, thermal comfort, ventilation theory, advanced ventilation systems, air treatment systems, indoor air quality assessment and mitigation strategy, indoor air quality management in intelligent buildings.
Occupational Safety and Health Issues in Buildings:
This course introduces various occupational safety health issues in buildings, particularly those required by the Occupational Safety and Health Ordinance and other local regulations. Emphasis will be on the practical aspects of fire and life safety, lighting, general ventilation, exhaust ventilation, occupational hygiene, and hazardous material management.
UNIT 4: FINANCIAL ASSESSMENT OF INTELLIGENT BUILDING SYSTEMS
Modern technological advancements of intelligent building systems could provide safe, healthy and comfortable living with conveniences. The success of deploying these systems that are technically feasible requires accurate financial assessment. Basic tools and methods of financial assessment will be introduced to analyze the state-of-the-art technologies that could make the buildings inspirational in the contemporary and life cycle analyses of these inventions and power logistics offer solutions to secure sustainability for the humanity.
UNIT 5: ENERGY MANAGEMENT IN BUILDINGS
Renewable and non-renewable energy resources, review of energy conversion technologies, energy use in domestic/non-domestic buildings, energy economics, design guides, energy management and energy auditing.

SUGGESTED READINGS:
Anil Ahnja M/E Integrated Design Building Systems Engineering, Chapman & Hall,115 Fifth Avenue, New York, NY 10003
Albert Ting-pat So Intelligent Building System, Boston: Kluwer Academic, c1999
CIDB intelligent Building Singapore: Construction Industry Manual. Development Board, 1998
Carlson, Reinhold A Understanding Building Automation Systems. Kingston, MA: R.S.Means, Co., c1991
O. Gassmann, H. Meixer Sensors in Intelligent Building, Weinheim, Singapore: Wiley- VCH, 2001
Boed, Viktor Controls and Automation for Facilities Managers: Boca Raton, Fla: CRC Press, c1999
Chen, Kao Energy Effective Industrial Illuminating Systems: Libum, GA: Fairmont Press; Englewood Gliggs NJ: Distributed by PTR Prentice Hall, c1999
http://www.sengpp.ust.hk/programs/ibtm/en/curriculum.html#IBTM5050 "Intelligent Building Technology and Management", Department of Mechanical and Aerospace Engineering, The Hong Kong University of Science and Technology.

Course Number: CEM709, Course Title: TUNNEL AND HARBOUR DOCK ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2020-21
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: TUNNELING
Introduction about tunnels, advantages and disadvantages of tunnels compared to open cuts, Criteria for selection of size and shape of tunnels, Advantages of twin tunnels and pilot tunnels, portals and adits, construction of shaft. Factors affecting methods of tunneling.
UNIT 2: GEOMETRIC DESIGNSMETHODS OF DRIVING TUNNELS IN SOFT GROUND
General characteristics of soft ground, needle beam method and NATM method of tunneling in practice, TBM.
UNIT 3: DRIVING TUNNELS IN HARD GROUND
General sequence of operation and typical distribution of time for each operations, meaning of the term 'Faces of Attack', Mucking, methods of removal of muck.
UNIT 4: VENTILATION AND LIGHTING
Methods of Ventilation, Lighting and aspects of drainage. Guniting, industrial flooring, Production of crushed sand and crushed aggregates, pneumatic drilling equipment, Use of RMC plants and jet grouting techniques.
UNIT 5: DOCKS AND HARBORS
Introduction, Requirements of harbors and ports, classification of harbors with examples, selection of site for harbor. Definitions/ methods of Breakwater, Wet and Dry Dock, Quay, Bulkhead, Wharves, Jetty, Dolphines, Dock fenders, use of Tetrapods, Triars, Quadripads and Hexapods

SUGGESTED READINGS:
1. Tunnel Engineering S.C.Saxena
2 Tunnel Engineering Handbook John o. Bickel,Thomas R.Kuesel,Elwyn H.king 2 nd edition
3 Tunnel and Harbour Dock Engineering B.L. Gupta & Amit Gupta 2004
4 Bridge Tunnel and Railway Engineering S.P.Bindra
5 Harbour, Dock and Tunnel Engineering R.Srinivasan 26th edition, 2013
6 Roads, Railways, Bridges and Tunnel Engineering T.D.Ahuja & G.S.Birdi 16th edition, 2012
7 Engineering In Rocks for Slopes, Foundations and Tunnels Prof. T.Ramamurthy (Ed.) 2nd edition, 2011
8 Roads, Railways, Bridges, Tunnels & Harbour Dock Engineering B.L.Gupta & Amit Gupta Reprint 2011
9 Method of measurement of building and civil engineering works: Part 25 tunneling (IS 1200 : Part 25) Bureau of Indian Standards (BIS), Govt. of India 1971
10 Low-Speed Wind Tunnel Testing (PB) Barlow 2010

Course Number: CEM710, Course Title: ADVANCED BUILDING SERVICES DESIGN
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: FUNCTIONAL PLANNING OF BUILDINGS
The process of identifying activity area & linkages–drawing built diagrams – checking for circulation, ventilation, structural requirements and other constraints – preparing sketch plans and working drawing–site plants. Consideration of comfort factors such as acoustics, lighting, ventilation and thermal aspects.
UNIT 2: SUSTAINABLE BUILDINGS
Design of safe and sustainable buildings
UNIT 3: SERVICES LAYOUT
Integrated services layout in design documentation
UNIT 4: RESIDENTIAL BUILDINGS
Design solutions for residential buildings
UNIT 5: COMMERCIAL BUILDINGS
Design solutions for commercial buildings

SUGGESTED READINGS:
Roger Greeno, Building Services HandbookFred Hall,
Butterworth-Heinemann, 2001 – Building
Roger Greeno, Building Services, Technology and Design (Chartered Institute of Building), 1997 ISBN-13: 978-0582279414 ISBN-10: 0582279410
Asif Syed, Advanced Building Technologies for Sustainability, 2012
ISBN-13: 978-0470546031 ISBN-10: 0470546034 Edition: 1st
W. Otie Kilmer and Rosemary Kilmer, Ted Buchholz, Designing Interior, Thomas Learning, Inc.1992 ISBN-13:978-0-03-032233-4; ISBN-10:0-03-032233-2
Francis D. K. Ching, Foundation of 2-D Design Architectural Graphics, Fifth Edition 2009, John Wiley & Sons, ISBN 978-0470-39911-8
http://www.taylorandfrancis.com/buildingconstruction/textbooks/

Course Number: CEM711, Course Title: SUSTAINABLE GREEN BLDG DSGN & ECO VILL.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: PRINCIPLES OF SUSTAINABLE TACHNOLOGY
UNIT 2: ECONOMICS AND ENVIRONMENT
Green Building Basics, The Economics of Green Buildings; Selecting Environmentally and Economically Balanced Building Materials
UNIT 3: BUILDING RATING SYSTEM
UNIT 4: PRE-DESIGN ISSUES
Green Building Design Pre-Design , Local Government Information, Sustainable Site Design, Water Issues, Site Materials and Equipment
UNIT 5: BUILDING DESIGN
Passive Solar Design, Daylighting, Building Envelope, Renewable Energy
UNIT 6: BUILDING SYSTEMS
Indoor Environmental Quality, HVAC, Electrical, and Plumbing Systems, Indoor Air Quality, Acoustics, Building Commissioning, Materials and Specifications, Improving Indoor Air Quality, Materials, Specifications, Environmental Construction Guidelines
UNIT 7: EVOLUTION OF ECO-VILLAGES
Community strengthening practices, organic food production, ecology
SUGGESTED READINGS:
How to Build or Remodel Energy Efficient Homes and Businesses, VOLUNTARY GREENBUILDING MANUAL, Southern California Edison, Coachella Valley Association of Governments, Terra Nova Planning & Research and Interactive Design Corporation
GREEN BUILDING GUIDE: Design Techniques, Construction Practices & Materials for Affordable Housing, Principal Author Craig Nielson, LEED AP, Rural Community Assistance Corporation.
SUSTAINABLE BUILDING TECHNICAL MANUAL, Green Building Design, Construction, and Operations, Public Technology Inc. n US Green Building Council Sponsored by U.S. Department of Energy n U.S. Environmental Protection Agency.
Eco-villages: Lessons for Sustainable Community, Karen T. Litfin (Univ. of Washington)
Sustainable Construction: Green Building Design and Delivery, 3rd Edition

Course Number: CEM712, Course Title: Auto-CAD CIVIL
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:1+T:0+P:3+S:0), Min.pds./sem.: 52

AutoCAD Civil engineering design software is a civil design and documentation solution that supports Building Information Modeling (BIM) workflows. Using AutoCAD Civil 3D, infrastructure professionals can better understand project performance, maintain more consistent data and processes and respond faster to change.

Course Number: CEM713, Course Title: GIS APPLICATIONS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:1+T:0+P:3+S:0), Min.pds./sem.: 52

GIS software is interoperable, supporting the many data formats used in the infrastructure life cycle and allowing civil engineers to provide data to various agencies in the required format while maintaining the data's core integrity. GIS technology provides a central location to conduct spatial analysis, overlay data, and integrate other solutions and systems. Built on a database rather than individual project files, GIS enables civil engineers to easily manage, reuse, share, and analyze data, saving time and resources.

Course Number: CEM714, Course Title: ECOTECT
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:1+T:0+P:3+S:0), Min.pds./sem.: 52

Autodesk Ecotect Analysis sustainable design analysis software is a comprehensive concept-to-detail sustainable building design tool. Ecotect Analysis offers a wide range of simulation and building energy analysis functionality that can improve performance of existing buildings and new building designs.

Course Number: CEM715, Course Title: HISTORY OF STRUCTURES
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods(55 mts. Each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: HISTORICAL DEVELOPMENT OF STRUCTURES
UNIT 2: SURVEYING MATERIALS & CONSTRUCTION DETAILS
UNIT 3: STRUCTURAL SYSTEMS
UNIT 4: CASE STUDIES OF HISTORICAL STRUCTURES AS EVOLVED (Early periods upto Concrete Structures)
UNIT 5: STUDY OF HISTORICAL BUILDINGS OF DAYALBAGH AND AGRA**.**

SUGGESTED READING:
Nathan Holth, HistoricBridges.org, Researching Historic Metal Structures: Unlocking the Treasure of Free Online Digitized Texts.
T. M. Charlton, A History of the Theory of Structures in the Nineteenth Century: 1st Edition (7/8/2002), Publisher: Cambridge University Press.
Tadaki Kawada, History of the Modern Suspension Bridge: Solving the Dilemma Between Economy and Stiffness (4/30/2010), Publisher: American Society of Civil Engineers.
Andrew Charleson, Structure As Architecture: A Source Book For Architects And Structural Engineers: 1st Edition (8/11/2005), Publisher: Taylor & Francis.
Eda Kranakis, Constructing a Bridge: An Exploration of Engineering Culture, Design, and Research in Nineteenth-Century France and America (3/2/2000), Publisher: MIT Press

Course Number: EEM706, Course Title: ELECTRO-MAGNETIC FIELD THEORY
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Periods (55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: ELECTROSTATICS
Coulomb's law, Gauss law and its applications. Electrostatic dipole. Energy of an Electrostatic system. Capacitance. Dielectrics. Electrostatic boundary conditions. Laplace's equation. Methods of images. Poisson's equation. Solution of Electrostatic problems in planar, cylindrical and spherical geometries.
UNIT 2: ELECTRIC CURRENT & MAGNETOSTATICS
Derivation of Ohm's law. Equation of Continuity. Relaxation time. Resistance of arbitrary conductors. Ampere's law. Biot-Savart's law. Forces in steady magnetic fields. Analogy between Electric current and magnetic dipoles. Energy in a Magnetostatics system. Fields in conductors and magnetic materials.
UNIT 3: TIME VARYING FIELDS & PLANE WAVES
Electromagnetic induction. Motional E.M.F. Self and Mutual Inductance. Displacement current. Maxwell's equations. Wave equation and its solution. Sinosoidal Time variation. Plane waves. Intinsic Impedance. Polarization. Reflection and refraction of plane waves at conductor and dielectric boundaries at normal incidence. Poynting's vector.
UNIT 4: WAVEGUIDE FUNDAMENTALS
Basic Waveguide Operation, Plane Wave Analysis of the Parallel-Plate Waveguide, Parallel Plate Guide Analysis using the Wave Equation, Rectangular Waveguides, Dielectric Waveguides.
UNIT 5: PRINCIPLES OF RADIATION AND ANTENNAS
Basic Antenna Principles, Hertzian Dipole, Radiation Resistance and Directivity, Linear Antennas, Antenna Arrays, Aperture Antennas, Receiving Properties.

SUGGESTED READINGS:
William Hayt: ENGINEERING ELECTROMATICS
Corson & Lorrain: INTRODUCTION TO ELECTROMAGNETIC FIELDS & WAVES
Jordan & Balmain: ELECTROMAGNETIC WAVES & RADIATING SYSTEMS

Course Number: EEM710, Course Title: SOFTWARE DESIGN
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:5, Periods (55 mts. each)/week:5(L:4+T:1+P:0+S:0), Min.pds./sem.: 65

UNIT 1: INTRODUCTION TO SOFTWARE ENGINEERING
Software and software engineering, phases in software engineering, software engineering paradigms- waterfall, prototype, Spiral model.
Structural Modeling Techniques: Basic Building Blocks – Objects and classes, Structural Composition Techniques, Design Scaling issues.
Introduction to Unified Modeling Language
UML Behavioral Modeling Techniques: Use Case Diagrams, Interaction Diagrams, Event State Diagrams, Action Matrices, Business Lifecycle Diagrams, Activity Diagrams, Collaboration Diagrams, Rule Specification Techniques, Behavioral Model-Based Reference Architecture for Component Specification, Component View and Deployment View.
Lab: Learning a Visual Modeling Tool
UNIT 2: SOFTWARE REQUIREMENTS & SPECIFICATION

Analysis tasks and the analyst, analysis principles, methods of information gathering; requirements specification; characteristics, components, validation.
Structured Analysis: Methodology, data flow diagrams and data dictionary, SA extensions – ER models and state transition diagrams
Object Oriented Analysis:
Lab: Using CASE Tools for Requirements Analysis
UNIT 3: SOFTWARE DESIGN
System Design: Objectives, principles, modular design, common design heuristics; modules specifications, verification, metrics
Structured Design Methodology: Structure charts, transform analysis, transaction analysis, Detailed design; procedural design, verification.
Object Oriented Design Methodology
Lab: Using CASE Tools for Software Design
UNIT 4: COADING AND TESTING
Coding: Programming practice, Structured Programming, Programming style, Internal Documentation, verification; goals approaches;
Testing: Fundamentals, White Box testing: Statement Coverage, Edge Coverage, Condition Coverage, Path Coverage Criterion; Black Box Testing Strategy; Levels of Testing: Unit Testing, Integration Testing, System Testing and Acceptance Testing; Analysis – Reviews, walkthroughs, Software Quality, Representative Quality Metrics.
Lab: Learning Software Testing Tools
UNIT 5: SOFTWARE PROJECT MANAGEMENT
The software management process: measuring software–size-oriented metrics and function oriented metrics; cost estimation; decomposition techniques–LOC and FP estimation–an overview; empirical estimation models–COCOMO and Putnam models–an introduction, staffing and personnel planning, team structure; risk management–an overview; software configuration management; quality assurance plans project monitoring plans.
Lab: Using COCOMO- I and COCOMO-II software

SUGGESTED READINGS:
Jalote P.: AN INTEGRATED APPROACH TO SOFTWARE ENGINEERING, Narosa.
James Rumbaugh etal: "OBJECT ORIENTED MODELING AND DESIGN", PHI.
Booch Grady: "OBJECT ORIENTED ANALYSIS & DESIGN WITH APPLICATION 3/E", Pearson Education, New Delhi.
Pressman RS: SOFTWARE ENGINEERING: A PRACTITIONER'S APPROACH, McGraw Hill.
Fairley RE: SOFTWARE ENGINEERING CONCEPTS, McGraw Hill.
Maryhauser AV: SOFTWARE ENGINEERING METHODS AND MANAGEMENT, Academic Press.
Yourdon E: MODERN STRUCTURED ANALYSIS AND DESIGN, Prentice Hall.
IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, IEEE Software.

Course Number: EEM719, Course Title: VLSI DESIGN TECHNIQUES
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits:3, Total pds. (55 mts each)/week:3(L:3+T:0+P:0+S:0), Min. pds./sem.: 39
[SAME AS PHM911]
UNIT 1: MOSFET DESIGN FUNDAMENTALS
MOS Transistor Fundamentals: MOS structure and operation, C-V characteristics, scaling and small geometry effects, capacitances. SPICE Modeling of MOS transistors and their comparisons.
Fabrication of MOS: Fabrication Process flow, CMOS n-well process, Layout design rules, Full custom Mask layout design.
CMOS inverters: Static characteristics. Switching characteristics and interconnect effects. Power dissipation. Super buffer design. Low power design fundamentals.
UNIT 2: STATIC CMOS DESIGN
Static CMOS Logic: Combinational complex logic circuits, transmission gate logic. Sequential logic circuits, bistable elements, SR latch, clocked flip flops.
Input-Output circuits: ESD protection, Latch and its prevention, Design of bi-directional I/O pads. Clock generation and distribution.
UNIT 3: DYNAMIC CMOS DESIGN
Dynamic CMOS Logic: Pass transistor principles, voltage bootstrapping, charge sharing, synchronous dynamic circuits, high performance dynamic CMOS circuits.
Semiconductor memories: SRAM, DRAM(6-T, 3-T, 1-T), operation principles, read write cycles, sense amplifiers.
UNIT 4: VLSI DESIGN METHODOLOGIES
VLSI Design flow (Y-chart), hierarchy, regularity, modularity and locality.
VLSI design styples: Standard Cell, PLA, MUX-based, Sea of Gates and Gate Array, PLD, FPGA.
CAD tools: Layout tools, Simulation and verification tools. Synthesis tools.
Introduction to HDL: Instruction set of HDL and exercises for programming ASIC/FPGA/CPLDs.
UNIT 5: DESIGN FOR TESTABILITY

Design quality: testing yield, manufacturability, reliability. Manufacturing test faults, Fault models, Observability, controllability. Scan based techniques, BIST techniques, IDDQ technique.

SUGGESTED READING:
NHE Weste & K Eshraghian: PRINCIPLES OF CMOS VLSI DESIGN
SM Kang & Y Leblebici: CMOS DIGITAL INTEGRATED CIRCUITS
RJ Baker, HW Li & D Boyce: CMOS-CIRCUIT DESIGN, LAYOUT AND SIMULATION
J Rabaey: DIGITAL INTEGRATED CIRCUITS-A DESIGN PERSPECTIVE
M Abramovici, MA Breuer & AD Friedman: DIGITAL SYSTEMS TESTING & TESTABLE DEISGN
J Bhaskar: VHDL PRIMER
Sameer Palnitkar: VERILOG HDL

Course Number: EEM720, Course Title: COMPUTER NETWORKS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Total pds. (55 mts each)/week:3(L:3+T:0+P:0+S:0), Min. pds./sem.: 39

UNIT 1: INTRODUCTION [8 pds]
Evolution and uses of Computer Networks, Network structure, concepts of data transmission, Analog and digital data transmission. Transmission Media: Twisted pair, Coaxial cable, Optical Fibre, Terrestrial and Satellite Microwave, Radio.
UNIT 2: THE OSI REFERENCE MODEL [8 pds]
Design Issues for various layers, OSI Layers and their functions, Data Transmission in OSI Model, OSI Terminology. Delay models in Networks, Little's Theorem, M/M/1 queues.
UNIT 3: MEDIUM ACCESS SUBLAYER [7 pds]
Static and Dynamic channel allocation in LANs, CSMA, CSMA/CD. IEEE Standard 802.3, 802.4, 802.5, Comparison of 802 standards. Link level control (IEEE802.2): Stop and wait and sliding window protocols, Error control.
UNIT 4: NETWORK LAYER [8 pds]
Design issues, Routing Algorithms, Congestion control algorithms, Internetworking: Bridges, Gateways, Internet Protocol (IP).
UNIT 5: TRANSPORT LAYER [8 pds]
Design Issues, services provided to the Session layer, Quality of Service. Transport Protocols: TCP and UDP, Applications: TELNET, FTP, E-Mail, www.

SUGGESTED READING:
AS Tanenbaum: COMPUTER NETWORKS
W Stallings: DATA AND COMPUTER COMMUNICATIONS
Gallagher and Bertsekas: DATA NETWORKS

Course Number: EEM722, Course Title: DIGITAL IMAGE PROCESSING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2011-12
Total Credits:3, Total pds.(55 mts each)/week:3(L:3+T:0+P:0+S:0)Min. pds./sem.: 39

UNIT 1: IMAGE FUNDAMENTALS
Visual perception by human eye, Brightness Adaptation and Discrimination, Image Models, Sampling and quantization, Colour models, File formats.
UNIT 2: IMAGE ENHANCEMENT IN SPATIAL DOMAIN
Point Operations: Image negative, contrast stretching, Brightness, Grey level slicing, Bit plane slicing, Histogram Processing.
Spatial Operations: Smoothing filters, Median Filter, Sharpening filters, High boost filtering, derivative filtering, Robert, Previtt, Sobel operators, Second order derivatives, Laplacian Mask.
UNIT 3: IMAGE ENHANCEMENT IN FREQUENCY DOMAIN
Review of Fourier Transforms, Discrete Fourier Transforms, 2-dimensional DFT, Low pass (smoothing) filters, High pass filters.
UNIT 4: IMAGE SEGMENTATION
Point detection, line detection, edge detection, combined detection, Edge linking and boundary detection-Hough transforms, Thresholding.
UNIT 5: IMAGE COMPRESION
Fundamentals: Coding redundancy, Inter-pixel redundancy, Psycho-visual redundancey, Fedility criterion.
Compression Models: Source encoder and decoder, Channel encoder and decoder.
Lossless compression: Variable length coding, bit plane coding, lossless predictive coding.
Lossy compression: Lossy predictive coding, Transform coding.

SUGGESTED READINGS:
RC Gonzalez & RE Woods: DIGITAL IMAGE PROCESSING, Pearson Education
AK Jain: FUNDAMENTALS OF DIGITAL IMAGE PROCESSING, PHI
COMPUTER VISION HOME PAGE: Http://www.cs.cmu, edu/~cil/txtvision. html

Course Number: MEM708, Course Title: MANAGERIAL ECO. & INDUSTRIAL ORGAN.
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2002-03
Total Credits:3, Periods (55 mts. each)/week:4 (L:3+T:1+P:0+S:0), Min.pds./sem: 52

UNIT 1: INTRODUCTION
Circular flow of economic activity, Nature of firm, Concept of economic profit, Economics and decision making, Functional relationships and Economic Models; Total Average and Marginal functions; Money, Bank and Exchange.
UNIT 2: DEMAND ANALYSIS
Meaning of demand. Type of demand. Determinants of demand. Demand elasticities. Factors influencing demand.
UNIT 3: PRODUCTION FUNCTION
Input output relationship, Least cost combination of inputs, factor productivities and return to scale. Managerial uses of production functions.
UNIT 4: COST ANALYSIS AND MARKET STRUCTURE
Economic concept of cost; Production and Cost; Cost functions. Perfect Competition; Monopoly; Profit maximization price and output in short run and long run.
UNIT 5: PRICING
Definitions. Determinants of price. Pricing under different market structures.

SUGGESTED READINGS:
Mote VL & Paul Samuel: MANAGERIAL ECONOMICS CONCEPTS AND CASES
DN Dwivedi: MANAGERIAL ECONOMICS
Vasudevan & Ghosh: MANAGERIAL ECONOMICS
HC Peterson & WC Lewis: MANAGERIAL ECONOMICS

Course Number: EGC781, Course Title: CO-OP TRAINING
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits:4

The students are expected to undergo practical training in different industries allotted to them at different places, in order to acquaint themselves. The various shop floor activities, industrial environment, problems faced in industries. They are required to submit a report on the training and the evaluation through internal and external viva voce.

Course Number: RDC781, Course Title: RURAL ENGINEERING PROJECT
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits:1, Periods (55 mts. Each)/week:2 (L:0+T:0+P:2+S:0), Min.pds./sem.: 26

In order to implement the knowledge gained through the course related to village industries and entrepreneurship, the students undertake project related to establishment of small scale industries.

Course No.: CEM801, Title: CONTRACTS&STATUTORY PROV.FOR BULDG.
Class: B. Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week:4(L:3+T:1+P:0+S:0), Min.pds./sem:40

UNIT 1: BUILDINGS
Occupancy classification of buildings – general requirements of site and building- building codes and rules – licensing of building works. Functional planning of buildings such as residential, institutional, public, commercial and industrial buildings.Introduction to estimating, types of estimates, drawing attached with these estimates, Units of Measurement and units of payment of different items of work, Preparation of detailed estimate, detailed reports, specifications, abstract of cost and material statement for small residential, building with flat, etc. Tendering, Invitation to tender by private invitation, by negotiations, essential characteristics of a tender notice, opening, acceptance of tender. Types of tenders, Earnest money, Security deposit, retention amount and its essential characteristics and purpose of retention amount.
UNIT 2: ANALYSIS OF RATES
Steps in analysis of rates of material, labour and contractors profit. Calculation of quantities of materials for plain cement concrete of different proportions, brick masonry in cement and lime mortar, plastering and pointing with cement mortar in different proportions, white washing. Analysis of rates for earth work in excavation, cement concrete in foundation, damp proof course, RCC &RB in roof slabs, cement plaster, cement polishing-flush, deep pointing.
UNIT 3: IRRIGATION
Calculation of earth work for inclined channels with the help of drawings for different cross-sections, preparation of detailed estimate for a brick lined distributory, laying a water supply line (CI pipe), detailed estimate for sanitary and water supply fittings in a domestic containing one set of toilets and septic tank and estimates for laying brick sewer.
UNIT 4: ROADS
Methods for calculating earth work using average depth, average cross sectional area and graphical method. Calculations of quantities of materials for roads in plains for given drawings, detailed estimate of a single span slab culvert with return wing walls. Calculation of different items of work for a masonry retaining wall from given drawings.
UNIT 5: CONTRACT AND ITS LEGAL DEFINITION
Contract by private party and public body. When contract becomes void, Discharge of contract, Types of Contract.Execution of the Contract, Conditions with respect to the power and duties of Architect, Contractors duties and liabilities under the contract, Problems arising out of contract conditions, prime cost, provisional sums. Purpose and principles of valuation. Definition of terms such as depreciation, sinking fund, salvage and scrap value. Valuation of building property by replacement cost method and rental return method.

SUGGESTED READINGS:
B S Patil, Contracts and Estimates, Universities Press
Frank R Dagostino, Lesilie Feigenbaum, Estimating in Building Construction
Leonard P Toenjas, Construction Estimating

Course No.: CEM802, Title: CIVIL ENGINEERING PROJECT II
Class: B.Tech.(Civil), Status of Course: Major Course, Approved since session: 2014
Total Credits:8; Pds./Week: 8 (L:0:T:0;P:8;S:0)

At the final year level the students in a group of 3 or 4 undertake project work in different area of specialization, CAD,Finite Element Methods, Simulation, Smart Homes, Sustainable and energy efficient technologies, Town planning, Sensor networks and intelligent technologies etc. This involves fabrication & testing of software development and their application etc.

Course No.: CEM803, Title: SEMINARS
Class: B.Tech., Status of Course: Half Major Course, Approved since session: 2000-01
Total Credits:1, Periods(55 mts. each)/week:2(L:0+T:0+P:0+S:2), Min.pds./sem.:24

Latest developments of Civil Engineering are floated as Seminar topics for term papers.
Students prepare term papers on topics allotted to them by their respective supervisors. They present it in Seminars.

Course Number: CEM804 Course Title: ENVIRONMENTAL ENGINEERING

Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1:
Sources, Quality and Quantity Perspectives of Water: Surface sources, subsurface sources, physical characteristics, chemical characteristics, biological characteristics, water quantity estimation, water consumption rate, fluctuations in rate of demand, design periods, population forecasting methods.
UNIT 2:
Collection and Conveyance of Water: Intakes, types of Intakes, factors governing location of intakes, pumps, types of conduits, types of pipes, pipe appurtenances
Purification of Water – Water Treatment: Operations involved in water treatment, screening, plain sedimentation, sedimentation aided with coagulation, filtration, disinfection, water softening, miscellaneous treatments.
UNIT3:
Distribution System: Requirements of a good distribution system, methods of distribution, systems of supply of water, Distribution reservoirs, layout of distribution system, design of distribution system, analysis of pipe networks of distribution system, appurtenances in distribution system, detection and prevention of wastage of water in a distribution system.
UNIT 4:
Quality and Quantity Perspectives of Sewage: Physical, chemical and biological characteristics of sewage, analysis of sewage, estimation of dry weather flow, estimation of storm water flow.
Sewers and sewer appurtenances: Hydraulic design of sewers: hydraulic formulae for design of sewers, minimum velocity of flow in sewers, maximum velocity of flow in sewers, effect of variation in flow of sewage on velocity of flow in sewers, forms of sewers, design of storm water drains. Construction of sewers: factors affecting the selection of material for sewer construction, materials for sewers, joints in sewers, shapes of sewers, maintenance, cleaning & ventilation of sewers. Sewer appurtenances.
UNIT 5:
Treatment of sewage: Preliminary & primary treatment of sewage: screening, grit removal basins, tanks for removal of oil and grease, sedimentation, sedimentation aided with coagulation. Secondary treatment of sewage: activated sludge process, sewage filtration, miscellaneous methods such as oxidation ditch, oxidation ponds, aerated lagoons, rotating biological contractors. Treatment and disposal of sludge, on-site disposal methods, advanced sewage treatment, treated effluent disposal & reuse.

SUGGESTED READINGS:
Peavy, H.S, Rowe, D.R., and G. Tchobanoglous (1985), Environmental Engineering, McGraw Hill Inc., New York.
P.N. Modi (2006), Water supply Engineering – Environmental Engineering (Vol.I) – Standard Book House.
S.K. Garg (1999), Water supply Engineering – Environmental Engineering (Vol.I) – Khanna Publishers.
P.N. Modi (2008), Sewage treatment & Disposal and waste water Engineering – Environmental Engineering (Vol.II) – Standard Book House.
S.K. Garg (1999), Sewage Disposal and Air Pollution Engineering – Environmental Engineering (Vol.II) – Khanna Publishers.
Metcalf & Eddy, Inc. (2003), Waste water Engineering Treatment and Reuse, McGraw Hill Inc., New Delhi.
Masters, G.M. (1994), Introduction to Environmental Engineering and Science, Prentice Hall of India, New Delhi.
Ruth F. Weiner and Robin A. Matthews (2003), Environmental Engineering, Butterworth- Heineman.
Nicholas P. Cheremisinoff (2002), Handbook of Water and Wastewater Treatment Technologies, Butterworth- Heineman.
Environmental Engg. Vol. I Water supply, Dr. B.C. Punmia Standard Book House 1979, Dams &
Hydro Projects in India Civil Engg. & Construction Review
Sulabh International Movement. Vision 2000 plus - S.P. Singh the Printing Eye. New Delhi
Environmental Sanitation, Joseph A. Salvato, Pub. Chapman & Hall Ltd. John Wiley & Sons inc
Bio gas A manual of use, planning and report- A Sathianathan Ass of village & rural dev. (AVARD)
Urban Projects manual, Experiences form dev. Countries, Clifford CuIpin, others, Liverpool Univ. Press, 1983
The basic need approach to development, D P Ghai, A R Khan, E L Hlee, T Alfthan, ILO, Geneva, 1977
Drinking Water & Health Edited by Frederick W. Pontius Wiley Inter science A John Wiley & Sons, Inc.Pub. 2003.
A text book of Water supply & Sanitary Engineering, S.K. Hussain IIIrd Edition, Oxford and IBH,1993

Course No.: CEM805 Course Title: ANALYSIS& DSGN OF HYDRAULIC STRUCT.
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1: INTRODUCTION:
Classification of dams, Gravity dams, Earth dams, Arch dam, Buttress dam, Steel dams, Timber dams, selection of site for dam, selection of type of dam, investigations of dam sites, Engineering surveys, Geological investigations, Types of hydropower plants, site selection for power plant, General arrangement of a hydropower project.
UNIT 2: PRINCIPLES OF DESIGN OF HYDRAULIC STRUCTURES
Hydraulic structures on permeable foundations, Theories of subsurface floor, Khosla's method of independent variables, Exit gradient, Location of Hydraulic jump, water surface profiles, scour due to subsurface flow, Design Principles, Energy dissipation principles.
UNIT 3: GRAVITY DAMS
Types of storage head works, Forces acting on gravity dams, Analysis of gravity dams, Profile of a gravity dam, Finite Element Method, Design of gravity dam, joints in gravity dam, Galleries in gravity dam, Adits and shafts, Construction of gravity dam, Foundation Grouting, Instrumentation of gravity dams.
UNIT 4: EARTH DAMS
Types of earth dams, Causes of failure of earth dams, Seepage analysis, phreatic line, flow net construction, criteria for safe design of gravity dams, typical cross sections of earth dams, Stability analysis, Seepage control, design of filters.
UNIT 5: SPILLWAYS AND ENERGY DISSIPATION SYSTEMS
Essential requirements of spillways, Required spillway capacity, component parts of spillway, Types of spillways, Design of Ogee spillway, Design of shaft spillway, Design of siphon spillway, Design of stilling basins. Hydropower structures - Storage power plant, Runoff River plant, Pumped storage plant, Water conveyance systems, Tunnels and Penstocks, Gates, Surge tanks, Power house layout.

SUGGESTED READINGS:
1. GOLZE, A. R., HANDBOOK OF DAM ENGINEERING, VON ROSTRAND REINHOLD CO., 1977
2. SHARMA, H.D., CONCRETE DAMS, CBIP PUBLICATION, 1998.
3. SIDDIQUI, I H, DAMS AND RESERVOIRS: PLANNING, ENGINEERING, OXFORD UNIVERSITY PRESS, USA, 2009.

Course Number: CEM806 Course Title: MACHINE FOUNDATION DESIGN
Class: B.Tech., Status of Course: Major Course, Approved since session: 2000-01
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1: GENERAL PRINCIPLES OF MACHINE FOUNDATION DESIGN
Introduction, Types of Machines and Foundations, General requirements, Permissible Amplitude, Allowable soil pressure, Permissible stress of concrete and steel, Permissible stresses of Timber.
UNIT 2: FOUNDATIONS OF RECIPROCATING MACHINES
Modes of vibration of a rigid foundation block, methods of analysis, linear elastic weightless spring methods, elastic half space method, effect of footing shape on vibratory response, dynamic response of embedded bock foundations, soil mass participating in vibrations, design procedure for a block foundation.
UNIT 3: FOUNDATIONS OF IMPACT MACHINES
Introduction, Dynamic analysis; single degree freedom system, Multi degree freedom system, determination of initial velocity of hammer, stress in the pad, stresses in the soil, Design procedure for a hammer foundation.
UNIT 4: FOUNDATIONS OF ROTARY MACHINES
Introduction, special considerations, design criteria, loads on a turbo generator foundation, methods of analysis and design, resonance method, amplitude method, combined method, three dimensional analysis.
UNIT 5: VIBRATION ISOLATION AND SCREENING
Introduction, force isolation, motion isolation, screening of vibrations by use of open trenches, passive screening by use of pile barriers, problems.

SUGGESTED READINGS:
1. "HANDBOOK OF MACHINE FOUNDATIONS" SRINIVASULU, P. AND VAIDYANATHAN, C. V., TATA MCGRAW-HILL, NEW DELHI, 2001
2. "FOUNDATIONS FOR MACHINES, ANALYSIS AND DESIGN" PRAKASH SHAMSHER AND PURI VIJAY K, JOHN WILEY AND SONS, USA, 1988

Course Number: CEM807, Course Title: URBAN PLANNING AND INFRASTRUCTURE
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 52

UNIT 1: TOWN PLANNING THEORY
Evolution of towns – problems of urban growth-beginning of town planning acts – ideal towns – garden city movement – concept of new towns -comprehensive
planning of towns. Survey and analysis of town-base maps- land used classification – transportation network - housing – demographic and social surveys – economic studies.
UNIT 2: CONCEPT OF MASTER PLAN
Structure plan, detailed town planning scheme and action plan. Estimating future needs – planning standards for different land use allocation for commerce, industries, public amenities, open areas etc, - planning standards for density distributions – density zones – planning standards for traffic network – standard of roads – Plan implementation –town planning legislations and municipal acts – panning of control development schemes – urban financing – land acquisition –slum clearance schemes – pollution control aspects.
UNIT 3: HUMAN SETTLEMENT PLANNING AND URBAN DEVELOPMENT:
Concepts, approaches, strategies and tools
Urban Policies and Programmes:
Policies and programmes at various levels, impact on metro and mega city development.
UNIT 4: URBAN WATER SUPPLY AND SANITATION PLANNING
Quantity & quality, source of supply, transmission and distribution, treatment methods, design guidelines.Sanitation – concepts, disposal systems, low cost sanitation options; engineering aspects of sewage disposal; Wastewater – generation, disposal system. Storm water drainage – systems
Solid Waste Disposal and Management**:** Basic principles, generation, characteristics, collection, disposal, management.
UNIT 5: FIRE AND ELECTRIFICATION
Planning for fire protection, services and space standards, location criteria
Traffic and Transportation: Planning for infrastructure and facilities for transport.
Social Infrastructure: Planning for Education, health, civic, cultural infrastructure.

SUGGESTED READINGS:
1. H. Miller, Patric Geddes, Routledge London Printer 1990
2. P.Healey, Planning Theory, Pergamon Press 1981
3. Andrews, Richard B. Urban growth and development: A problem approach. New York, Simmons-Boardman, 1962.
4. Ferguson, T; Benjamin, B.; Daley, Allen; Glass, D.V.; Mckeown, Thomas; Johnson, Gwendolyn Z; Mackintosh, J.M., Public health and urban growth, London, Center for Urban Studies, 1964
5. Robert, Introduction to town planning, Mnotype publishers, 1974
6. Browm A.J. Introduction to town and country planning
7. Wilson, Forrest, City planning : The games of human settlement, New York, Van Nostrandreinhold, 1975
8. Chowdhury, Anis; Kirkpatrick, Colin, Development policy and planning: An introduction to models and techniques, London, Routledge, 1994.
9. Ghosh, Pradip K. Ed., Development policy and planning : A third world perspective, England, Greenwood Press, 1984.

Course Number: CEM808, Course Title: GROUND IMPROVEMENT TECHNIQUES
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 52

UNIT 1: INTRODUCTION
Need and objectives of Ground Improvement, Classification of Ground Modification Techniques – suitability and feasibility.
UNIT 2: Mechanical Modification
Principles of Mechanical Modifications - Methods of compaction, Shallow compaction, Deep compaction techniques – Vibro-floatation, Blasting, Dynamic consolidation, pre-compression and compaction piles.
Hydraulic Modification: Methods of dewatering – open sumps and ditches, Well-point system, Electro-osmosis, Vacuum dewatering wells; pre-loading with sand drains - strip drains, Design of vertical drains.
UNIT 3: PHYSICAL AND CHEMICAL MODIFICATION
Stabilisation with admixtures like cement, lime, calcium chloride, fly ash and bitumen. Grouting – materials and methods.
Reinforced Earth Technology: Concept of soil reinforcement, Reinforcing materials, Backfill criteria.
UNIT 4: REINFORCEMENT
Design of reinforcement for internal stability, Applications of Reinforced earth structures.
Ground Anchors and Soil Nailing: Types of ground anchors and their suitability, Uplift capacity of anchors; Soil nailing and Applications.
Soil Confinement Systems: Concept of confinement, Gabion walls, Crib walls, Sand bags, Evergreen systems and fabric form work.
UNIT 5: GEOTEXTILES
Overview on Geosynthetics – Geotextiles, Functions and Applications.

SUGGESTED READINGS:
1. MANFRED R. HAUSSMANN - ENGINEERING PRINCIPLES OF GROUND MODIFICATION – PEARSON EDUCATION INC. NEW DELHI, 2008.
2. BELL, F.G. – ENGINEERING TREATMENT OF SOILS – E& FN SPON, NEW YORK, 2006.
3. PURUSHOTHAMA RAJ, P "GROUND IMPROVEMENT TECHNIQUES" LAXMI PUBLICATIONS (P) LIMITED, 2006.

Course Number: CEM809, Course Title: RIVER ENGINEERING
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 52

UNIT 1
Introduction, river morpohology, drainage patterns, stream order.
UNIT 2
Properties of mixture of sediment and water, Incipient motion and quantitative approach to incipient motion, channel degradation and armoring.
UNIT 3
Bed forms and resistance to flow, various approaches for bed load transport, suspended load profile and suspended load equations,
UNIT 4
Total load transport including total load transport equations. Comparison and evaluation of sediment transport equations.
UNIT 5
Stable channel design with critical tractive force theory.

SUGGESTED READINGS:
River Mechanics - Pierre Y. Julien, ISBN: 9780521529709
Open-Channel Hydraulics - Ven Te Chow, ISBN-10: 1932846182

Corse Number: CEM810, Course Title: EARTHQUAKE RESISTANT DSGN OF STRUC.
Class: B.Tech., Status of Course: Major Course, Approved since session: 2021-22
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 52

UNIT 1: EARTHQUAKE ENGINEERING
Structure of earth – Plate Tectonics– Elastic Rebound Theory, Elements of Earthquake Engineering: characteristics and Measurement, Causes and Effects of Earthquakes Ground Motion Parameters: Amplitude, Duration and Frequency contents Seismic zone mapping of India.
UNIT 2: SEISMIC PLANNING
Structural Systems for Seismic Resistance, Building Configurations : Horizontal and Vertical Irregularities in geometry, stiffness, mass and load path. Review of the latest Indian seismic code IS:1893 – 2016 (Part-I), IS 4326:2013, IS 13827:1993, IS 13828:1993 provisions for buildings.
UNIT 3: STRUCTURAL DYNAMICS
Dynamic Characteristics of Buildings : Time Period, Mode Shape and Damping, Effects on Building Configuration Basics of Vibration - Lumped mass and continuous mass systems, Mode shapes and frequencies of SDOF and MDOF Systems. Methods of Dynamic Analysis : Equivalent Static, Response Spectrum, Push-over Analysis, Time History Analysis
UNIT 4: SEISMIC DESIGN
Earthquake design philosophy – Assumptions, Analysis for Earthquake Loads: IS: 1893-2002- Seismic Coefficient method, Applications to multi-storied building frames, Earthquake Protective Systems, Base Isolation Effectiveness of base isolation.
UNIT 5 : SEISMIC DETAILING
Provisions for ductile detailing of R.C buildings as per IS 13920:2016 - Moment redistribution, Principles of design of beam, column and beam-column joints SHEAR WALLS: Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.
SUGGESTED READINGS:
1.S.K.Duggal, “Earth Quake Resistant Design of Structures”, Oxford University Press, 2nd Edition, 2013
2. Pankaj Agarwal & Manish Shrikhande, “Earthquake Resistant Design of Structures”, 5th Edition, Prentice Hall of India, New Delhi, 2009.
3. Sekhar Chandra Dutta, "Improving Earthquake and Cyclone Resistance of Structures: guidelines for the Indian subcontinent", The Energy and Resources Institute, TERI.
4. Jai Krishna A.R, Chandrasekharan A.R, Brijesh Chandra, “Elements of Earthquake Engineering”, 2nd Edition, South Asian Publishers, New Delhi, 2001.
5. Chopra A.K., “Dynamics of Structures”, 5th Edition, Pearson Education, Indian Branch, Delhi, 2007.
7. IITK-GSDMA and IITK-BMTPC Resources
References:
Codes : IS 1893 : 2016, IS
13920:2016, IS 4326:2013, IS
13827:1993, IS 13828:1993

Course Number: CEM811, Course Title: CONSTRUCTION TECHNOLOGY & MANAGEMENT
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1
Importance of Project Management, Role of Project manager, Stakeholders in construction project,
UNIT 2
Different types of projects, similarities & dissimilarities in projects., Time, Scope & Money, Knowledge areas & Processes involved in construction projects,
UNIT 3
WBS of a major work, with examples, Planning, monitoring & executing, Planning, sequencing, scheduling, Bar Charts, Networks, CPM, PERT, Upgrading, Cash flow diagram, resource levelling & resource allocation, Crashing of project, Cost Optimization,
UNIT 4
Invoicing, Preparation of RA bill, Safety in construction, Estimation, Tenders & Contracts
Contract management-Tenders/International Building procedures, Bid Evaluation, Professional Practice in engineering and Urban Legislations.

UNIT 5

Equipment for construction, Construction Finances – decision making, Construction of piles, Construction of Tunnels, Construction of cofferdams.

SUGGESTED READINGS:

PUERIFOY R.L. - CONSTRUCTION PLANNING EQUIPMENT & METHODS. PUNMIA AND KHANDELWAL K.K. - PROJECT PLANNING AND CONTROL - LAXMI PUBL. DELHI.
SRIVATSAVA, 1998. MANAGEMENT IN CONSTRUCTION INDUSTRY.
ANTIL & WOODH - CRITICAL PATH METHOD IN CONSTRUCTION - WILEY INTERNATIONAL. MAHESH VARMA - CONSTRUCTION PLANNING AND EQUIPMENT - METROPOLITAN

Course Number: CEM812, Course Title: WATER CONSERVATION AND REUSE
Class: B.Tech., Status of Course: Major Course, Approved since session: 2000-01
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1
Water purification: Theory, operation and design: Settling tanks, tube settlers, Coagulation and flocculation - Orthokinetic and Perikinetic, Slow and rapid sand filters.
UNIT 2
Methods, Theory and application of disinfection: chlorine, ozone, UV, Solar etc. Adsorption kinetics in water treatment.
UNIT 3
Design of water treatment plants; Wastewater characteristics, Wastewater Treatment: Theory, operation and design of aerobic (activated sludge and its variations, trickling filter, RBC and Oxidation ponds and ditches), anaerobic (anaerobic digestion, UASBR, anaerobic filter, lagoons);
UNIT 4
Secondary settling tanks. Tertiary wastewater treatment: Removal of N, P, K and other trace elements. Sludge treatment and disposal.
UNIT 5
Design of wastewater treatment plants. Advanced wastewater treatment systems: Root zone technology, wetlands, Duckweeds, Membrane processes (RO, Ultra and Nano filtration, Ion Exchange). Centralized vs decentralized systems, low cost water and wastewater systems. Disposal of treated wastewater: Inland surface water, land for irrigation, marine coastal areas.

SUGGESTED READINGS:
Punmia, Jain& Jain, Wastewater Engineering, Laxmi Publications.
Karia G.L.&Christian R.A., Wastewater Treatment: Concepts and Design Approach, PHI Learning
http://nptel.ac.in/courses/Webcourse-contents/IIT-KANPUR/wasteWater/

Course Number: CEM813, Course Title: INTELLIGENT SERVICES
Class: B.Tech., Status of Course: Major Course, Approved since session: 2014-15
Total Credits:3, Periods(55 mts. each)/week: 4 (L:3;T:1,P:0, S:0), Min.pds./sem: 40

UNIT 1
Components of urban forms and their planning. Concepts of neighourhood unit. Street system and layout in a neightourhood.
UNIT 2
Functional planning of buildings, optimization of space: Spatial Synthesis graphical techniques, heuristic procedures, formulation of linear and nonlinear optimization problem. Space requirements and relationships for typical buildings, like residential offices, hospitals, etc.
UNIT 3
Standard fire, fire resistance, classification of buildings, means of escape, alarms, etc.
UNIT 4
Engineering services in a building as a systems. Lifts, escalators, cold and hot water systems, waster water systems, and electrical systems.
UNIT 5
Building Maintenance: Scheduled and contingency maintenance planning. M.I.S. for building maintenance. Maintenance standards. Economic maintenance decisions.

SUGGESTED READINGS:
Don Sapp&Plexus, Scientific Facilities Operations & Maintenance
Brian J.B. Wood& Wiley Blackwell, Building Maintenance
Barrie Chanter &Peter Swallow, Building Maintenance Management
http://www.amazon.com/Building-Maintenance-Management-Barrie-Chanter/dp/1405135069 - #,
M.David Egan, Concepts in Building Fire Safety
V.K.Jain, Fire Safety in Buildings
E.G.Butcher, Smoke control in Fire-safety Design
National Building Code 2005.

Course Number: EEM821, Course Title: NEURAL NETWORKS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 3, Total pds. (55 mts each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39
UNIT 1: INTRODUCTION
Brain style computing, origins, issues; biological neurons, artificial neuron abstraction, activations and signals, neuron signal functions, neural networks, architectures, salient- properties and application domains. Geometry of binary threshold neurons, pattern classification, linear separability, pattern dichotomizers, TLN capacity, layering, XOR problem.
UNIT 2: SUPERVISED LEARNING

Pattern and weight space, Perceptron learning, convergence, alpha and mu LMS algorithm and convergence issues, MSE error surface. Multilayered networks, back-propagation learning algorithm, hand worked examples, applications, universal approximation.
UNIT 3: ATTRACTOR NEURAL NETWORKS
Additive and multiplicative activation models, Cohen-Grossberg Dynamics, Lyapunov analysis. OLAM, Hopfield networks: dynamics, stability issues, continuous and discrete time operation, electronic interpretation, CAM, error correction, applications, and spurious attractors. Bidirectional associative memory: stability issues, bivalent BAM theorem, examples, error correction, signal Hebbian learning.
UNIT 4: UNSUPERVISED LEARNING I
Adaptive Resonance Theory, noise- saturation dilemma, on-center off surround shunting networks, competitive learning. ART overview, STM and LTM equations, ART 1 classification, comparison, search, learning algorithm, applications.
UNIT 5: UNSUPERVISED LEARNING II
Maximal eigen vector filtering, generalized learning laws, vector quantization, Mexican hat networks, self-organizing feature maps, applications. Research discussions.

SUGGESTED READING:
Haykin: NEURAL NETWORKS : A COMPREHENSIVE FOUNDATION
McClelland & Rumelhart: PARALLEL DISTRIBUTED PROCESSING- EXPLORATIONS IN THE MICROSTRUCTURE OF COGNITION, VOL. 1, 2 AND 3, MIT PRESS, CAMBRIDGE, MA 1986.
Special Issues of Journals: APPLIED OPTICS, VOL. 26, DECEMBER 1987; IEEE Computer: Vol. 21, No. 3, March 1988; IEEE Trans. SMC: Vol. SMC-13, No-5, 1983.
Hirsch & Smale: DIFFERENTIAL EQUATIONS, DYNAMICAL SYSTEMS AND LINEAR ALGEBRA, WILEY INTL., 1974.

Course Number: EEM823, Course Title: SYSTEMS OPTIMIZATION USING EAS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 3, Total pds. (55 mts each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem.: 39

UNIT 1: INTRODUCTION TO OPTIMIZATION
Single Objective Optimization (SOP); Deterministic Optimization Methods (Gradient Descent, LP and QP); Stochastic Optimization Methods (Random search, Simulated Annealing, Evolutionary Algorithms); Difficulties in Single Objective Optimization; Difficulties with Classical Optimization Algorithms; Need for Evolutionary Algorithms.
UNIT 2: EVOLUTIONARY ALGORITHM
EA operators (Selection, Recombination and Mutation Operators); Single Objective Optimization (SOP) using Eas; Design & Parameterization for Single Objective Applications; Continuous Formulation and representation issues for different real world engineering SOPs; some competent EAs.
UNIT 3: CONSTRAINED SOP
Discovery of innovative knowledge through Optimization; Difficulties in Eas; No Free Lunch Theorem; Enhancing efficiency of Eas through incorporation of domain specific information and hybridization with expressly designed algorithms.
UNIT 4: INTRODUCTION TO MULTI-OBJECTIVE OPTIMIZATION (MOP)
Concept of Pareto optimality; Issues in Multi-Objective Optimization; Multi-Objective Evolutionary Approaches; Design & Parameterization for Multi-Objective Applications.
UNIT 5: DYNAMIC OPTIMIZATION
Constrained Multi-Objective Optimization; Dynamic Optimization; Robust Optimization; some real-world MOPs and their solution using MOEAs.

SUGGESTED READINGS:
OPTIMIZATION FOR ENGINEERING DESIGN: K Deb
GENETIC ALGORITHMS IN SEARCH, OPTIMIZATION AND MACHINE LEARNING: DE Goldberg
INTRODUCTION TO EVOLUTIONARY COMPUTING (NATURAL COMPUTING SERIES): AE Eiben & E Smith
EVOLUTIONARY ALGORITHMS IN ENGINEERING APPLICATIONS: D Dasgupta & Z Michalewicz
EVOLUTIONARY ALGORITHMS, THEORY AND PRACTICE: J Back
MULTI-OBJECTIVE OPTIMIZATION USING EVOLUTIONARY ALGORITHMS: K Deb

Course Number: EEM824, Course Title: FUZZY SYSTEMS
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits:3, Total pds.(55 mts each)/week: 4(L:4+T:0+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Introduction to fuzzy concepts; fuzzy systems; modelling vague, imprecise and uncertain information; comparison of binary logic and fuzzy logic; historical development of fuzzy logic.
UNIT 2: BASICS OF FUZZY SET THEORY
Introduction to fuzzy sets; representation of fuzzy sets; fuzzy set theory; basic operations on fuzzy sets like union, intersection, complementation, compensation, intensification, dilation and concentration; methods for drawing membership functions.
UNIT 3: FUZZY LOGIC AND APPROXIMATE REASONING

Uncertainty measure; fuzzy logic and resolution principle; fuzzy modus ponens; knowledge representation; truth tables and linguistic approximations.

UNIT 4: FUZZY CONTROL

Introduction to fuzzy control; comparison of fuzzy and classical controllers; design parameters of fuzzy controllers; optimisation of fuzzy controllers.

UNIT 5: OTHER APPLICATIONS

Applications of fuzzy systems in various domains including decision making, system identification modelling and simulation.

SUGGESTED READINGS:

R Kruse, Gebhart and F Klawonn: FOUNDATION OF FUZZY SYSTEMSHJ Zimmerman: FUZZY SET THEORY AND ITS APPLICATIONS

GJ Klir and TA Folger: FUZZY SETS, UNCERTAINTY AND INFORMATIONAT Ross: FUZZY SYSTEMS AND ITS ENGINEERING APPLICATIONS

B Kosoko: NEURAL NETWORKS & FUZZY LOGIC SYSTEMS: DYNAMIC SYSTEMS APPROACH TO MACHINE INTELLIGENT

Course Number: EEM825, Course Title: MOBILE COMPUTING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2015-16
Total Credits: 3, Periods (55 mts. each)/week: 3(L:3+T:0+P:0+S:0), Min.pds./sem: 39

UNIT 1: INTRODUCTION
What is mobile computing? Comparison to wired networks, Why go mobile? Type of Wireless Communication Networks, Types of wireless devices, Mobile objects, Moving object databases (MOD), Issues in Mobile Computing, Applications of mobile computing, Challenges, Future of mobile computing.
OVERVIEW OF WIRELESS TELEPHONY
Introduction to Cellular Mobile Systems: Basic cellular system, operation of cellular systems, Air-interface, Channel Structure, Channel assignment, Location management: HLR, VLR.
UNIT 2: MOBILITY MANAGEMENT AND GENERATIONS OF TELECOMMUNICATION SYSTEM
Mobility Management in Cellular Mobile System: Cellular architecture, Co-Channel interference, Mobility: handoff, types of handoffs; location management, HLR-VLR scheme, hierarchical scheme, predictive location management schemes.
Generations of Telecommunication System: GSM: Mobile services, System Architecture, Radio, interface, Protocols, Localization and Calling Handover, Security, New Data Services, GSM, Short Message Service, VOIP service for Mobile Networks.
GPRG Third-Generation Systems: W-CDMA and cdma2000; Improvements on Core Network; Quality of Service in 3G, Wireless Local Loop; Wireless Local Loop Architecture; Deployment Issues; TR-45 Service Description; Wireless Local Loop Technologies. TETRA, UMTS and IMT-2000: UMTS Basic Architecture, UTRA FDD mode, UTRA TDD mode.
UNIT 3: WIRELESS LAN AND HIPERLAN
WIRELESS LAN: Infrared vs. Radio transmission, Infrastructure and Ad hoc Networks.
IEEE 802.11: System architecture, Protocol architecture, Physical layer, Medium Access Control layer, MAC management, Future development.
HIPERLAN: Protocol architecture, Physical layer, Channel access control sublayer, Medium Access Control sublayer, Information bases and Networking. Bluetooth, Wireless Broadband (WiMax)
UNIT 4: MOBILE NETWORK LAYER
Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation, Optimizations, Reverse 18 unneling, Ipv6; Dynamic host configuration protocol, Ad hoc networks MANET: Routing, Destination sequence distance vector, Dynamic source routing, Hierarchical algorithms, Alternative metrics.
Mobile Transport Layer: Traditional TCP: Congestion control, Slow start, Fast, retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP.
UNIT 5: MOBILE COMPUTING ARCHITECTURE AND FILE SYSTEM SUPPORT FOR MOBILITY
Mobile Computing Architecture: Three Tier Architecture for mobile computing, Design considerations, Mobile Computing through Internet.
File System Support for Mobility: Distributed file sharing for mobility support, Coda and other storage manager for mobility support.
Language Support, Wireless application protocol, Mobile agents, security and fault tolerance, Service Discovery, Device Management, Wireless devices and their Operating System: PalmOS; Windows CE; Android, Symbian OS; Linux for Mobile Devices.

SUGGESTED READINGS:
Jochen Schiller: MOBILE COMMUNICATIONS, Addison wisely, Pearson Education.
William CY Lee: MOBILE CELLULAR TELECOMMUNICATIONS, TMH
Wireless and Mobile Network Architecture: Yi Bang Lin and Imrich Chlamtech (Wiley)
Rajkamal: MOBILE COMPUTING, Oxford Press.
Rappaaort: WIRELESS COMMUNICATIONS PRINCIPALS AND PRACTICES.
YI Bing Lin: WIRELESS AND MOBILE NETWORK ARCHITECTURES, John Wiley.
UmeHansmann, LotharMerk, Martin S. Nicklous, Thomas Stober: PRINCIPLES OF MOBILE COMPUTING, Springer

Course Number: MEM809, Course Title: NANO-TECHNOLOGY & NANO-COMPUTING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2007-08
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52
[Same as PME214]

UNIT 1: NANOTECHNOLOGY
Nanosystems, Molecular machinery and Manufacturing, quantum mechanics mechanosynthesis, Ideas of Richard Feynman.
Nanocomputing: Introduction, Nanocomputing Technologies, Carbon nanotubes, Nano information processing, Silicon Nanoelectronics, Prospects and Challenges.

UNIT 2: CARBON NANOTUBES

Properties, Molecular Structure, Chiral Vector, Carbon nanotube Electronics, Carbon Nanotube Field-effect Transistors.

UNIT 3: IMPERFECTIONS AND RELIABILITY

Nanocomputing with Imperfections: Nanocomputing in presence of Defects and Faults, Redundancy, Error Control Coding, Reconfiguration, Fault Simulation, Defect Tolerance, Reconfigurable Hardware, Overcoming Manufacturing Defects.

Reliability of Nanocomputing: Markov Random Fields, Examples, Reliability Evaluation Strategies, Law of Large Numbers, NANOPRISM.

UNIT 4: NANOSCALE QUANTUM COMPUTING

Quantum Computers, Challenges to Physical Realization, Quantum-dot Cellular Automata (QCA), QCA Clocking, Design Rules, Placement, Basic QCA Circuits using QCA Designer Software and their implementation.

UNIT 5: MOLECULAR AND OPTICAL COMPUTING

Molecular Computing: Background of molecular electronics, Adleman's Experiment, DNA Computation, Bacteriorhodopsin, Challenges before Molecular Computing.

Optical Computing: Introduction, use of Optics for Computing, Optical Computing Paradigms, Ultrafast Pulse Shaping, Photonic Switches.

SUGGESTED READING:

NANO, QUANTUM AND MOLECULAR COMPUTING- IMPLICATIONS TO HIGH LEVEL DESIGN AND VALIDATION: SK Shukla & RI Bahar (Eds.), *Kluwer Academic Publishers*

NANOCOMPUTING- AN INTRODUCTION: V Sahni and D Goswami, *Tata McGraw Hill Publishers*

QUANTUM COMPUTING: V Sahni, *Tata McGraw Hill Publishers*

NATIONAL SCIENCE AND TECHNOLOGY INITIATIVE (NSTI), DST (INDIA), <http://dst.gov.in/scientific-programme/ser-nsti.htm

NATIONAL NANOTECHNOLOGY INITIATIVE, NSF (USA), <http://www.nsf.gov/home/crssprgm/nano/nni.htm>

Course Number: MEM811, Course Title: FUTUROLOGY STUDY
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2013-14
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Future scan: A tool for management decision; the decision making process: from need to objectives; search for alternatives, precision, assumptions; Conceptualization of decision making, some illustrations.
UNIT 2: STRATEGIES FOR FUTURISTIC STUDIES-1
Technology forecasting and assessment, Quantitative methods, Regression analysis: time series and Fuzzy time series analysis.
UNIT 3: CONSENSUS
The morality of systems, A science of values, Consumerism and consumer protection, Social indicator of Quality of life, Measures of Consensus and Agreement.
STRATEGIES FOR FUTURE STUDIES-2
SWOT Analysis, Creative idea engineering: Descriptive and Normative elements; Delphi scenario building methodology: Seth-Harva method, Fuzzy Delphi Method.
UNIT 4: STRATEGIES FOR FUTURE STUDIES-3
Planning and decision making; Hierarchical modeling, Option Field and Option Profile Methodology, Conflict Resolution: Meta game theory.
UNIT 5: NEWER METHODS
Neural networks, System Dynamics and Quantum computing as a tool for future studies, Preliminary concepts and applications to sample problem, Blue Ocean Strategy, White Mountain strategy: for futuristic Planning.

SUGGESTED READING:
Roberts: MANAGERIAL APPLICATION OF SYSTEM DYNAMICS RG Coyle: MANAGEMENT SYSTEM DYNAMIC
PS Satsangi & V S Gautam: MANAGEMENT OF RURAL ENERGY SYSTEM
AE Thompson: UNDERSTANDING FUTUROLOGY AND INTRODUCTION TO FUTURES STUDY
SC Seth: INDIA THE NEXT 7000 DAYS VNK Reddy: PROBLEMS OF FUTUROLOGY STERLING
Michael R Goodman: STUDY NOTES ON SYSTEM DYNAMICS

Course Number: MEM812, Course Title: NON-CONVENTIONAL ENERGY ENGINEERING
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2013-14
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem.: 52

UNIT 1: INTRODUCTION
Energy consumption scenario of India and the world. Importance of Non-conventional sources of energy. Modern trends in saving fuel.
SOLAR ENERGY: Solar energy perspective and prospects. Solar radiation. Heat transfer analysis for flat plate and concentrator collectors. Introduction to solar refrigeration. Solar drier. Solar storage system, Solar ponds.
UNIT 2: BIO-ENERGY
Introduction to Bio-gas & Bio-Mass energy. Bio-gas producer design. Scope of gas plant. Community size Bio-gas plants in rural areas.
UNIT 3: TIDAL AND OCEAN ENERGY
Introduction to tidal power plant. Site selection for tidal power plant. Classification and working of different tidal power plants, OTEC systems for power generation.
GEO-THERMAL ENERGY: Form of Geo thermal energy. Dry steam & wet steam systems, environmental effects.
UNIT 4: WIND ENERGY
Wind map in India. Historical development of wind mill & power from wind mill. Construction & working of different wind mills for water pumping.
MAGNETO HYDRODYNAMIC ENERGY: Introduction and principles of MHD generators. Thermal ionization, components of an MHD generator.
UNIT 5: HYDROGEN ENERGY
Hydrogen as a fuel. Methods of Hydrogen production. Storage and utilization of Hydrogen as a fuel.

SUGGESTED READING:
Kreider JF & Krieth F: SOLAR HEATING & COOLING Domkundwar: POWER PLANT ENGG.
Rai, GD: NON-CONVENTIONAL SOURCES OF ENERGY Chaman Kasshkan: ENERGY
Sukhatme & Nayak: SOLAR ENERGY

Course Number: MEM813, Course Title: SUPPLY CHAIN MANAGEMENT
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2013-14
Total Credits: 3, Periods (55 mts. each)/week: 4(L:3+T:1+P:0+S:0), Min.pds./sem: 52

UNIT 1: INTRODUCTION
Introduction, principles and overview of Supply Chain Management (SCM). Complexity of SCM. Conflicting objectives between supply chain partners. Porter's Value Chain concept. Sequential vs. global optimization in the Supply Chain.
UNIT 2: INVENTORY MANAGEMENT
Inventory Management in the context of SCM. Effect of demand uncertainty. Multiple Order Opportunities with/without fixed order costs. Risk Pooling. Centralized vs. decentralized systems. Practical issues. Case Studies.
UNIT 3: VALUE OF INFORMATION
The value of information. The Bullwhip Effect. Quantifying the Bullwhip Effect. Benefits of Information Sharing. Distribution Strategies - Direct shipping, Cross-Docking. Centralized vs. decentralized control. Push vs. pull systems. Configuring Logistics Networks. Case Studies.
UNIT 4: ALLIANCES
Strategic Alliances. Vendor Managed Inventory. Third Party Logistics. Retailer-Supplier relationships. Distributor Integration. Coordinated Product & Supply Chain Design. Design for Logistics. Manufacturing Postponement. The Push-Pull boundary. Case Studies.
UNIT 5: IT FOR SCM
Information technology for SCM. Goals. Infrastructures. E-Commerce. Mathematical models and computer assisted decision support for SCM. Metrics for measurement of logistics and supply-chain performance. Future trends and issues.

SUGGESTED READING:
Christopher, M., Logistics and Supply Chain Management, Richard Erwin, 1994. '0
Copacino, W. C., Supply Chain Management: The basics and beyond, APICS, St. Lucie Press, 1997.
Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., Designing and Managing the Supply Chain: Concepts, Strategies, and Cases, Irwin/McGraw-Hill, 1999.
Tayur, S., Ganeshan, R., and Magazine, M., Quantitative Models for Supply Chain Management, Kluwer Academic Publishers, 1999.

Course Number: RDC881, Course Title: RURAL ENGINEERING PROJECT
Class: B.Tech., Status of Course: CORE COURSE, Approved since session: 2000-01
Total Credits: 1, Periods (55 mts. each)/week: 2 (L:0+T:0+P:2+S:0), Min.pds./sem.: 26

In order to implement the knowledge gained through the course related to village industries and entrepreneurship, the students undertake project related to establishment of small scale industries.

Course Number: CAC881, Course Title: CO-CURRICULAR ACTIVITIES
Class: B.Tech., Status of Course: MAJOR COURSE, Approved since session: 2000-01
Total Credits: 3, Periods (55 mts. each)/week: 2 for 26 weeks, Min.pds./sem: 52

Participation by the students in sports and games, literary, social, cultural and professional activities is compulsory. The proficiency attained in them is evaluated every year and counted in the assessment of the overall performance of the student to encourage a balanced and all-round development of their personality.