PURBANCHAL UNIVERSITY
FACULTY OF SCIENCE AND TECHNOLOGY

FINAL
CURRICULUM

BACHELOR'S DEGREE IN COMPUTER ENGINEERING

1. Introduction :

Purbanchal University is offering the bachelor's Degree Course in Computer Engineering through its own as well as affiliated colleges with the objective of producing high level technical manpower as per the nation need and with a capacity to undertake any kinds of computer engineering works using new technologies.

2. Details of the course:

The following given are the details of course:

2.1 Title of the course :

Bachelor in Computer Engineering

2.2 Objectives of the course:

The objective of the course is to train students with appropriate technical & analytical knowledge and skills required to enable them to function and practice as professional Computer engineers on all aspects of Computer Engineering works.

2.3 Duration of the course:

The total duration of the course is 4 years. Each year consists of two semesters and each semester has duration of 90 days.

Admission Procedure :

3.1 Eligibility:

a. The candidate must have passed I. Sc. Examination or Diploma in Engineering or 10+2 (science) from recognized Universities minimum in second division

b. The candidate must have passed entrance examination conducted by the University.

c. The successful candidates in the entrance examination will be admitted in merit basis in the University affiliated colleges.

Course structure:

4.1 Contents:

The teaching course is divided in eight semesters (half yearly). The first two semesters are general and are of prerequisite nature.

4.2 Subject codes:

Each subject is coded with specific letters and numbers. The code of all subjects that are offered in engineering program begins with three letters: **"BEG"** which denotes Bachelors in Engineering, which is followed by three numbers denoting subject offered in the particular half yearly semester. The first digit denotes the year for example 1,2,3&4 for first, second, third, & fourth respectively. The second and third digits 0, to 99 is used to represent specific subject i.e. subject code. The last two letters denote the department which offer the subject (e.g. SH-science & Humanity; ME – Mechanical Engineering; EE- Electrical Engineering; EC- Electrical Communication Engineering; AR – Architecture etc.) The subject code is provided as per the departments offering the subject. The total departments that are offering the subjects and subjects code provided for them as are below.

	Departments	**Subject Code**
1.	Science & Humanities in short **"SH**"	01 to 09
2.	Architecture in short **"AR"**	10 to 19
3.	Electrical in short **"EL"**	20 to 29
4.	Electronics & Communications in short **"EC"**	30 to 39
5.	Mechanical in short **"ME"**	40 to 49
6.	Civil in short **"CI"**	50 to 69
7.	Computer in short **"CO"**	70 to 89
8.	Management Science in short **"MS"**	90 to 99

Note:

The subject code of particular subject offering in particular year can remain the same for another subject which is being offered in another year. For example: the subject code of Engineering Geology is 58;.This subject is being offered in 2nd year, first semester with the code **BEG258CI.**. Similarly the subject code of Soil Mechanics is also 58 but this subject is being offered in 3rd year 1st semester with the code **BEG358CI**

Example :

BEG 104 HS is the code for subject **chemistry** (the subject code of chemistry is 04) which is offered in first year by the department of science & Humanities.

4.3. Teaching Methods:

The teaching methods applied are lecture, tutorial, practical and course work or course project. Tutorials are used to develop and enlarge the concepts stated in lecture. Practical classes in forms of laboratory works and drawing practice are used to verify the concept and develop required technical and analytical skills. Similarly, course works and course projects are aimed at creating necessary knowledge and skill to implement and present the acquired technical and analytical skills in the form of projects.

1. Evaluation and Grading system:

The evaluation of the students knowledge is done through internal assessments during the course and followed by final semester examination. For the theoretical components of a subject a weightage of 20% for the internal assessment and that of 80% for semester examination are allocated while for the practical component, the method of continuous assessment is adopted except for limited particular subjects in which semester examination are also conducted.

The student must obtain at least 40% mark in internal assessment in each subject to be eligible to sit in the final semester examination. The student should get 40% mark to pass in semester examination. The student who have passed all the subjects in all semester are considered to have successfully completed the course. The weightage of semester examinations for the overall evaluation of the students is as prescribed below:

a) First & second year (four semesters) : 20% each

b) Third & fourth year (four semester) : 30% each

Depending upon the final aggregate percentage scored, 4 passing grades A, B, C and D and one failing grade F are used. The letter grades used to show the academic standing of a student, with the following meaning and grade points i.e. weights are as follow:

Letter grade	Equivalent Marks	Meaning
A	80 – 100	Excellent
B	60 – 79	Good
C	50 – 59	Average
D	40 – 49	Poor
F	Below 40	Fail

Course Structure

I/I

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG101SH	Engineering Mathematics I	3	3	2	-	5
2.	BEG170CO	Computer Concept	3	3	-	2	5
3.	BEG103SH	Physics	4	4	1	2	7
4.	BEG146ME	Engineering Drawing I	2	1	-	3	4
5.	BEG148ME	Workshop Technology	2	1	-	3	4
6.	BEG105SH	Communicative English	3	3	1	-	4
7.	BEG175CO	Computer Programming	4	3	-	3	6
		Total	**21**	**18**	**4**	**13**	**35**

I/II

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG102SH	Engineering Mathematics II	3	3	2	-	5
2.	BEG176CO	Object Oriented Programming in C++	4	3	-	3	6
3.	BEG150CI	Applied Mechanics	3	3	1	-	4
4.	BEG104SH	Chemistry	3	3	1	2	5
5.	BEG147ME	Engineering Drawing II	2	1	-	3	4
6.	BEG122EL	Electro Engineering Material	3	3	1	-	4
7.	BEG123EL	Electrical Engineering I	3	3	1	3/2	5.5
		Total	**21**	**19**	**6**	**9.5**	**34.5**

II/I

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG201SH	Engineering Mathematics III	3	3	2	-	5
2.	BEG240ME	Thermodynamics, Heat and Mass Transfer	3	3	-	3/2	4.5
3.	BEG230EC	Digital Electronics	4	3	-	3	6
4.	BEG231EC	Electronic Devices	3	3	1	3/2	5.5
5.	BEG273CO	Data Structure & Algorithm	4	3	1	3	7
6.	BEG223EL	Electrical Engineering II	3	3	1	3/2	5.5
		Total	**20**	**18**	**5**	**10.5**	**33.5**

II/II

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG274CO	Theory of Computation	3	3	-	-	3
2.	BEG275CO	Visual Programming	4	3	-	3	6
3.	BEG233EC	Microprocessor	4	3	-	3	6
4.	BEG234EC	Electronic Circuit I	3	3	-	3/2	4.5
5.	BEG224EL	Electrical Machines and Drives	3	3	-	3/2	4.5
6.	BEG395MS	Applied Sociology	3	3	-	-	3
7.	BEG236EC	Electromagnetics & Propagation	3	3	1	3/2	4.5
		Total	**23**	**21**	**1**	**10.5**	**22.5**

III/I

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG370CO	Numerical Methods	3	3	-	3	6
2.	BEG330EC	Instrumentation I	3	3	-	3/2	4.5
3.	BEG371CO	System Analysis & Design	3	3	1	-	4
4.	BEG372CO	Computer Organization & Design	3	3	1	-	4
5.	BEG373CO	Operating System	4	3	-	3	6
6.	BEG320EL	Control System	3	3	-	3/2	4.5
7.	BEG331EC	Communication System	3	3	1	2	6
		Total	**22**	**21**	**3**	**11**	**35**

III/II

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG396MS	Research Methodology	2	2	1	-	3
2.	BEG203SH	Probability and Statistics	3	3	1	-	4
3.	BEG374CO	Computer Network	4	3	-	3	6
4.	BEG375CO	Computer Graphics	4	3	-	3	6
5.	BEG332EC	Microprocessor based Instrumentation	3	3	-	3/2	4.5
6.	BEG376CO	Database Management System	4	3	-	3	6
7.	BEG495MS	Engineering Economics	3	3	1	-	4
		Total	**23**	**20**	**3**	**10.5**	**33.5**

IV/I

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG470CO	Web Programming Technique	4	3	-	3	6
2.	BEG497MS	Organization and Management	2	2	-	-	2
3.	BEG471CO	Artificial Intelligence	3	3	1	3/2	5.5
4.	BEG472CO	Software Engineering	3	3	1	-	4
5.		Project Management	3	3	1	-	4
6.	BEG473CO	Simulation and Modeling	4	3	-	3	6
7.	BEG475CO	Elective I	3	3	1	3/2	5.5
		Total	**22**	**20**	**4**	**9**	**33**

IV/II

S. No.	Course Code	Course Description	Credits	Lecture	Tutorial	Laboratory	Total
1.	BEG476CO	Image Processing and Pattern Recognition	3	3	-	3/2	6
2.	BEG459CI	Engineering Professional Practice	2	2	-	-	2
3.	BEG433EC	Digital Signal Processing	3	3	-	3/2	4.5
4.	BEG477CO	Advance Computer Architecture	3	3	-	3/2	4.5
5.	BEG478CO	Elective II	3	3	1	3/2	5.5
6.	BEG480CO	Project Work	3	-	-	6	6
		Total	**17**	**14**	**1**	**12**	**27**

BE First Year Detail Semester

1st Year 1st Semester

&

1st Year 2nd Semester

MATHEMATICS I
BEG101SH

Year :I **Semester :1**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3		2	3	80	--	--	20	--	100	

Objective: The basic objective of the course is to provide a sound knowledge of calculus and other related topics.

1. **Limits and continuity of a function**: Limit of a function with examples, infinity as a limit, continuity of a function, simple properties of a continuous function. 3

2. **Derivatives**: Review of derivatives (Derivatives of Implicit, Parametric equation, hyperbolic and inverse hyperbolic functions), Higher order derivatives, successive derivatives and Leibnitz theorem, Functions of two or more variables, Partial derivatives, total differential coefficients. 6

3. **Applications of derivatives**: Extrema of function of two or three variables, mean value theorems, Taylor and Maclaurin's infinite series, Indeterminate forms and L'Hospital's rule, Tangent and normal, curvature, Assymptotes and curve tracing. 8

4. I**ntegration**: Basic integration formulas, Integration methods, Standard Integrals, Definite Integral and its properties, Definite integral as the limit of a sum, Fundamental theorem of integral calculus, Improper integrals, Reduction formulae for integrals, Beta and Gamma functions. 8

5. **Applications of Integral Calculus**: Determination of area, Lengths, Volumes and surface areas of solid of revolution, multiple integrals, change of order of integration. 5

6. **Plane Analytic Geometry**: Translation and rotation of axes, circles, conic sections, parabolas, ellipses, hyperbolas and central conics. 8

7. **Vector Algebra**: Vector components, zero vector, unit vector, addition, equality, Direction cosines, space co-ordinates (Cartesian, cylindrical and spherical co-ordinates), equation relating these co-ordinates, scalar and vector, product of two vectors, product of three vectors or more vectors, lines and planes. 7

Recommended Books:

1. Differential Calculus – M.B. Singh and B.C. Bajracharya,
   Sukunda Pustak Bhawan, Kathmandu.
2. Calculus and Analytic Geometry – Thomas and Finney

Narosa Publishing House, India.
3. Basic Mathematics (Vol. I and II) – D. R. Bajracharya
National Book Center, Kathmandu.
4. A text book of vector Analysis - M.B. Singh and B.C. Bajracharya,
Sukunda Pustak Bhawan, Kathmandu.

5. Integral Calculus and Differential Equations – G. D. Pant & G. S. Sth
Sunila Prakashan, Kathmandu.
6. Higher Coordinate Geometry – Lalji Prasad
Paramount Publications, Patna, India.
7. Two-dimensional Geometry – M.R. Joshi.

COMPUTER CONCEPT

BEG170CO

Year: I **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objective: To provide basic concept of computer system and its application

1. Types of Computers (3 hours)
- 1.1 Operation: Analog and Digital
- 1.2 Uses: General purpose and Specific purpose
- 1.3 Capacity: Mainframe, Mini, Personal and Super computer

2. Basic Architecture (4 hours)
- 2.1 Building blocks of a PC
- 2.2 CPU
- 2.3 RAM, DRAM, SDRAM, ROM, EPROM
- 2.4 Input/Output

3. Operating System (4 hours)
- 3.1 Definition
- 3.2 Functions of operating system
- 3.3 Types of OS: DOS, Windows, Mac OS, Unix, Linux, OS/2

4. Programming Language and Compiler (6 hours)
- 4.1 Introduction to programming language
- 4.2 Assembler, interpreter and compiler
- 4.3 Program Design, Programming Tools
- 4.4 Program Structure, Programming Algorithm
- 4.5 Program Specification

5. Software Applications (6 hours)
- 5.1 Word Processor
- 5.2 Spreadsheet
- 5.3 Database
- 5.4 Graphics
- 5.5 Engineering applications
- 5.6 Customized Packages

6. Computer Peripherals (8 hours)
- 6.1 Printer/Plotter
- 6.2 Scanner, Digital Camera, Digitizer
- 6.3 Sound system
- 6.4 Storage Devices: magnetic, optical, Zip drive,

7. Network and Internet (9 hours)
- 7.1 Peer to peer and dedicated server types

7.2 Topologies: Bus, Ring, Star
7.3 Network Cabling: 10Base2, 10BaseT,10Base5,100BaseT, Hub, Terminator, Coaxial, UTP, Fiber
7.4 Modem, Repeaters, Bridges, Routers, Radio Link
7.5 Networking Operating System: Novell Net Ware, Windows NT, LANtastic, Windows, UNIX, LAN Manager
7.6 Introduction to Client-Server Model

8. Computers in Business (5 hours)

8.1 Importance of computers in modern business
8.2 Business Information System
8.3 Introduction to e-commerce
8.4 Cyber Laws: Computer Crime, information privacy and security

Laboratory:

1. Six lab exercise covering computer hardware and software
2. Demonstration of Computer Network

References:

1. Winn Rosch, "Hardware Bible"
2. P.K.Sinha, "Computer Fundamentals"
3. Peter Nortons's Introduction to Computers Tata McGraw-Hill Publishing Company Limited

PHYSICS
BEG103SH

Year :I **Semester :1**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
	2	1	3	80	3	25	20	--	100	

Course objective: To provide the concept and knowledge of physics with the emphasis of present day application The background of physics corresponding to proficiency certificate level /+2 science is assumed.

Course details :

1. Simple harmonic motion. **4hrs**

1.1 Introduction ,Hook's law ,elastic restoring force ,equation of S H M (2 hrs)
1.2 Examples of SHM; Suspended mass spring system pendulum (bar pendulum) (1 hrs)
1.3 Angular harmonic motion: Torsional pendulum. (1 hrs)

2. Waves in elastic media **5 hrs**

2.1 Introduction to waves, types of wave; travelling wave, mechanical wave, speed of travelling wave in a stretched string, waves and particles. (2 hrs)
2.2 Energy and power in travelling waves, Intensity in wave motion (1 hrs)
2.3 Reflection of waves, Principle of superposition, interference of waves.(1 hrs)
2.4 Standing waves and resonance (1 hrs)

3. Acoustics **7 hrs**

3.1 Sound waves, Sound propogation in gases, liquids and solids, pressure variation due to waves. (1½hrs)
3.2 Attenuation, reflection and refraction (½hrs)
3.3 Beat phenomena and Doppler's effect. (1½hrs)
3.4 Energy considerations, intensity level and loudness. (1 hrs)
3.5 Ultrasound and its uses, production of ultrasound (Introduction) distances measurement, imaging, signaling, cleaning, and neating. (2½hrs)

4. Electrostatics **7 hrs**

4.1 Electric charge, Interaction between electric charges. (½hrs)
4.2 Electric field, lines of force,calculation of electric field due to dipole and quadrupole, electric flux (1hrs)
4.3 Gauss law, Application of Gauss Law to spherical, linear and planer symmetric distribution of charges. (2hrs)

4.4 Electric potential, potential difference, potential due to a point charge, potential gradient; (½hrs)

4.5 Potential due, to dipole and quadrupole, electrostatic potential energy. (½hrs)

4.6 Capacitors; parallel plate capacitor, spherical capacitor, permittivity, conductors and dielectric in electric field. E and D fields, energy stored in electric field and energy density. (2hrs)

4.7 Electrostatic induction, lightning conductors, industrial uses and hazards. (½hrs)

5. Direct Current **6 hrs**

5.1 Current flow in solids, liquids and gases. Ohm's law, Resistance in series and parallel. (½hrs)

5.2 Current and current density, atomic view of resistivity, effect of temperature on resistance. (1hrs)

5.3 Semiconductors: Intrinsic and extrinsic semiconductor, Introduction of PN Junction, NPN&PNP transistor (3hrs)

5.4 Energy loss, heat production, verification of joule's law. (1hrs)

5.5 Kirchhoff's law. (½hrs)

6. Magnetism and magnetic fields. **(10hrs)**

6.1 Sources of magnetic fields: current and permanent magnets, earth's magnetic field, lines of force flux of magnetic field and permeability.

(1 hrs)

6.2 Biot and Savart's law and its application to long straight conductor carrying current, Amperes theorem and its application to long straight conductor carrying current and solenoid carrying current.

(2 hrs)

6.3 Magnetic scalar potential and potential gradiant (1 hrs)

6.4 Force on conductor in magnetic fields, force per unit length between parallel conductors carrying current.

(1 hrs)

6.5 Faraday's law of electromagnetic induction, flux linkage, Lenz's law, self induction, calculation of the coefficient of self- induction for solenoid (2 hrs)

6.6 LR circuit, Energy stored in magnetic field, Energy density of magnetic field (1 hrs)

6.7 Magnetic properties of matter, Domain Theory, Ferromagnetism, Saturation and Hysteresis. (2 hrs)

7. Electromagnetic Oscillations. **(4hrs)**

7.1. LC oscillation , analogy to SHM (1hrs)

7.2. Electromagnetic oscillation (quantitative) forced oscillation and resonance, Induced magnetic field. (2hrs)

7.3. Displacement current and its applications. (1hrs)

8 Electromagnetic waves. **(4hrs)**

8.1. Maxwell's equation –Differential and Integral form (2hrs)

8.2. Application of Maxwell's equation, wave equations in free space and medium . (1hrs)

8.3. Speed of electromagnetic wave. Energy of electromagnetic wave, Poynting vector (1hrs)

9. Optics (Geometrical Optics) (15hrs)

9.1. Nature and source of light, different theories of light, different types of sources. (1hrs)

9.2. Review of optics of mirror and lenses, reflection and refraction both in plane and spherical surfaces, refraction through prism. `(1hrs)

9.3. Combination of lenses in contact and at a separation, cardi*na*l points, Achromatic combination of two lenses, separated by distance (2 hrs)

9.4 Monochromatic aberration of lenses, spherical aberration, astigmatism, coma, curvature of field and distortion, causes and their minimization (1 hrs)

9.5 Fibre optics: Introduction to optical fibre, Types of optical fibres, Uses in communication. (1 hrs)

9.6 Lasers: Principal of the generation of laser light, Uses of Laser. (1 hrs)

Physical Optics (8hrs)

9.7 Interference: Interference of light waves, Young's experiment, coherent sources, path difference and phase difference, condition for constructive and destructive interference, interference in thin films and wedge shape, Newton's ring and determination of wave length, blooming of lenses. (3 hrs)

9.8 Diffraction: Introduction of Fresnel's and fraunhoffer diffraction for a single and double slits and multiple slits. Diffraction grating, intensity variation in order, wave length measurement by diffraction gratings. (2 hrs)

9.9 Polarization: Introduction ,Polarization by reflection, Malu's law, double refraction, Nicol prism, plane, circular, elliptical polarization of light waves, Optical activity, polarimeter (2 hrs)

9.10 Use of light, distance measurement, signal transmission, optical stress analysis, spectrometric analysis of gases. (1hrs)

Laboratory : (Minimum 9 expts)

1. Physical pendulum, Torsional pendulum
2. Resonance tube
3. Newton's Ring, Diffraction grating, prism
4. Carryfoster bridge, Low resistance, resistivity, LC circuits.
5. Polarimeter, Junction transistor

Recommended books:

1. Physics by Resnick, Haliday 2^{nd}/ 4^{th} edition
2. Concept of Modern Engineering Physics by A.S. Vasudeva
3. Optics by subrhramanyam and Brij Lal
4. Practical Physics by C.L. Arora.

ENGINEERING DRAWING I
BEG146ME

Year :1 **Semester :1**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
1	3	0	--	--	3	40	10	50	100	

Course objectives: To develop the basic understanding and the skills of Engineering graphic technology to the students.

1.0 Instrumental Drawing; Practices & Techniques (2 hrs)

1.1 Equipment and Materials; Description of drawing instruments, auxiliary equipment and drawing materials

1.2 Techniques of Instrumental Drawing, Pencil sharpening, securing paper, proper use of T- squares, triangles, scales, dividers,
and compasses, erasing shields, French curves, inking pens

2.0 Freehand Technical lettering (2hrs)

2.1 Lettering strokes, letter proportions, use of pencils and pens, uniformity and appearance of letters, freehand techniques, inclined and vertical letters and numerals, upper and lower cases, standard English lettering forms.

3.0 Dimensioning (5hrs)

3.1 Fundamentals and Techniques; Size and location dimensioning, SI Conventions Use of scales, measurement units, reducing and enlarging drawings

3.2 General Dimensioning practices Placement of dimensions; aligned and unidirectional Recommended practice; some 50 items

4.0 Applied Geometry (8hrs)

4.1 Plane Geometrical construction ; Bisecting and trisecting lines and angles, proportional division of lines, construction of angles, triangles, squares, polygons. Construction using tangents and circular arcs. Methods for drawing standard curves such as ellipses, parabolas, hyperbolas, involutes, spirals, cycloid, helices and cam or heart wheel.

4.2 Solid Geometrical Construction; Classification and pictorial representation of solid regular objects such as;

Prisms: square, cubical, triangular and oblique
Cylinders: right and oblique
Cones : right and oblique
Pyramid : square, triangular, oblique, truncated

Doubly-Curved and Warped Surfaces: Sphere, torus, oblate ellipsoid, conoid, serpentine, paraboloid, hyperboloid (Definition)

5.0 Basic Descriptive Geometry (8hrs)

5.1 Introduction; Application of descriptive geometry, principles to the solution of problems involving positioning of objects in three-dimensional space.

5.2 The projection of points, Lines and planes in space

5.3 Parallel Lines

5.4 True Length of Lines; horizontal , inclined and oblique lines

5.5 Perpendicular Lines

5.6 Bearing of a Line
5.7 Point view or End View of a Line
5.8 Shortest Distance from a point to a Line
5.9 Principal Lines of a plane
5.10 Edge View of a plane
5.11 True shape of an Oblique plane
5.12 Intersection of a Line and a plane
5.13 Angle Between a Line and a plane
5.14 Angle Between Two Intersecting Lines
5.15 Angle Between Two Non- Intersecting (Skew) lines
5.16 Angle between two planes
5.17 Shortest Distance Between Two Skew Lines

6.0 Theory of Projection (2 hrs)

6.1 Common types of projections – Pictorial (Perspective, Isometric, Oblique) and Orthographic Projection

6.2 System of orthographic projection 1st angle projection and 3rd angle projection.

7.0 Multiview (Orthographic Projection Drawings (10 hrs)

7.1 Principal Views; Methods for obtaining orthographic views Projection of lines, angles and plane surfaces; analysis in three views Projection of curved lines and surfaces Object orientation and selection of views for best representation Full and hidden lines

7.2 Orthographic Drawings; Making an orthographic drawing Visualising objects from the given views Interpretation of adjacent areas True-length lines Representation of holes Conventional practices

8 Sectional Views (5 hrs)

8.1 Full Section
8.2 Half Section
8.3 Broken Section
8.4 Revolved Section
8.5 Removed (Detail) Section
8.6 Phantom or Hidden Section
8.7 Auxiliary Sectional views
8.8 Specifying Cutting Planes for Section
8.9 Conventions for hidden lines, holes, ribs, spokes

9 Auxiliary Views
(5 hrs)

9.1 Basic Concept and Use of Auxiliary Views
9.2 Drawing Methods and Types of Auxiliary Views
9.3 Symmetrical and Unilateral Auxiliary Views
9.4 Projection of Curved Lines and Boundaries
9.5 Line of Intersection Between Two Planes
9.6 True size of Dihedral Angles
9.7 True size and Shape of Plane Surfaces

10.0 Freehand Sketching and Visualization (4 hrs)

10.1 Sketching and Design; Value of Sketching as part of design

10.2 Techniques of Sketching ; Pencil hardness, squared paper, line densities Techniques for horizontal, vertical and circular lines

10.3 Multiview Sketches; Choice of views, adding detail, dimensioning, title, notes Proportioning and comparative sizing

10.4 Sketching pictorial Views; General pictorial sketching Mechanical methods of sketching and proportioning Isometric sketching Oblique sketching Perspective sketching Conventional treatment of fillets, rounds and screw threads Sketches of an exploded view to show assembly of components

11.0 Developments, Intersections and Interpenetration (9hrs)

11.1 Development General concepts and practical considerations Developments of a right or oblique prism, cylinder, pyramid, and cone Development of a truncated pyramid and cone Triangulation method for approximately developed surfaces Transition pieces for connecting different shapes Development of a sphere

11.2 Intersections & Interpretation Lines of intersection of geometric surfaces Piercing point of a line and a geometric solid Intersection lines of two planes Intersection of prisms and pyramids Intersection of a cylinder and an oblique plane Intersection of a sphere and an oblique plane Constructing a development using auxiliary views Intersection of two cylinders Intersection of a cylinder and a cone

LABORATORY **3 hr / week, 13 weeks**

1 Freehand Technical Lettering and Use of Drawing Instruments
2 Freehand Technical Lettering and Use of Drawing Instruments(cont)
3 Dimensioning
4 Geometrical and Projection Drawing
5 Descriptive Geometry
6 Descriptive geometry (contd.)
7 Projection and Multiview Drawing
8 Projection and Multiview Drawing (contd.)
9 Sectional Views
10 Auxiliary views
11 Freehand Sketching and Visualisation
12 Developments and Intersections
13 Developments and Intersections(contd.)

Recommended Books:

1. "Fundamentals of Engineering Drawing ", W.J. Luzadder, prentice Hall, 8th Edition,1981
2. "Engineering Drawing and Graphic Technology", T E. French, C.J. Vierck and R.J. Foster, McGraw Hill, 1981
3. "Technical Drawing", F.E. Giesecke, A. Mitchell, H.C,Spencer and J.T. Dygdone, Macmillan, 8th Edition, 1986

WORKSHOP TECHNOLOGY I

Year :1 **Semester :1**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
1.5	2.5	0			--	--	10	40-	50	

Course Objectives: To familiarize the students about the basic workshop practices using various hand tools and machine tools.

1.0 Introductory Concepts **(3 hrs)**

1.1 Introduction to the Subject
1.2 Classification of Manufacturing Processes Primary forming processes Secondary forming processes Physical forming processes
1.3 Processes affecting changes in properties
1.4 Simplification and standardization
1.5 Interchangeability
1.6 Inspection and Quality Control
1.7 Mechanization and Automation
1.8 Concept of Manufacturing and the Manufacturing System
1.9 The use of Computers in Manufacturing

2.0 Industrial Safety **(3 hrs)**

2.1 Introduction
2.2 Safety measures in Construction Works
2.3 Safety in handling hoisting equipment and conveyors
2.4 Protection in storage and manual handling of material
2.5 Concept of accident and its causes
2.6 Common sources of accidents
2.7 Common methods of protection
2.8 Electrical Hazards
2.9 Common precautions against electric shocks, damages and fires
2.10 Treatment for electric shocks
2.11 Factories Act Regulation with regard to safety

3.0 Plant and Shop Layout **(3 hrs)**

3.1 Introduction
3.2 Factors in Plant Layout
3.3 Objectives of Plant Layout
3.4 Advantages of a Good Plant Layout
3.5 Disadvantages of an Improper Plant Layout
3.6 Types of Layout Product, Layout Process, Layout Fixed, Position Layout, Group Layout
3.7 Tools and techniques of Plant Layout
3.8 Revising and Improving Existing Plant Layout

4.0 Metrology and Engineering Materials **(6 hrs)**

4.1 Semi-precision Tools; Rules and scales, Try square, Inside/ Outside Calipers, Depth gages etc.

4.2 Precision Tools Micrometers, Vernier calipers, Bevel protractor, Dial indicator, Gage blocks, Surface plates etc.

4.3 Classification of Materials; Metals & Alloys, Glass & Ceramics, Organic Polymers

4.4 Ferrous Materials Mild Steels, Alloy Steels, Stainless Steels, High Speed Steels (HSS)
Non- Ferrous Materials
Brass , Bronze, Aluminum, Copper Comparative Properties and Machinability
Tool Materials
Low, Medium and High Carbon steels Hot and Cold-Rolled steels, Alloy Steels Classification of Iron & Steels

4.5 Heat Treatment (Introduction and Purposes) Hardening, Tempering, Annealing , Normalizing, Quenching

5.0 Benchwork and Fitting Shop **(12hrs)**

5.1 Introduction to the familiarization with tools and their uses

5.2 Hammers; Hacksaws, Choice of blades & Sawing techniques

5.3 Files with their Classification; According to their longitudinal shape & cross section, Classification based on cuts; teeth; length of the file

5.4 Care of files and hand tool safety rules

5.5 Vices & their classification

5.6 Other Hand Tools; Scribers, Chisels, Scrapes, Center punch, Surface gauge, Universal scribing block, Trammel, Screw drivers, Drills, Spanners, Pliers, Taps, Dies, Reamers, Screw drivers etc.

5.7 Fitting Processes Marking, Chipping , Sawing , Filing , Scrapping, Drilling, Internal Threading (or Tapping), External Threading (or Dieing), Reaming.

5.8 Sheet Metal Works Tools, Marking & Layout, Bending & Rolling, Cutting Operations

6.0 Machine Shop **(15hrs)**

6.1 Definition, Function, Classification &Working principles of Machine Tools

6.2 Feed, Depth of Cut and Cutting Speed

6.3 Block Diagram, Names of its various parts, Various machining operations along with the Specifications of the following Machines; Lathe, Shaper, Planer, Milling, Drilling, Grinding Machines

6.4 Cutting Tool Materials of Lathe, Shaper and Drill

7.0 Welding Shop **(8 hrs)**

7.1 Gas Welding principle, equipment and types of flames

7.2 Arc Welding, principle and equipment

7.3 Arc Welding elements and gas welding rods.

7.4 Principle and application of Brazing and Soldering

7.5 Brazing and Soldering materials

7.6 Types of Welds and Joints fillet and butt welds; butt, lap, corner and T joints

7.7 Inspection of Welds: NOT & DT

8.0 Foundry Shop **(4 hrs)**

8.1 Forging, Forgeable Materials & Forging Tools

8.2 Difference of pattern and its functions

8.3 Refractories and Moulding tools, equipment

8.4 Casting processes

8.5 Inspection and testing of casting defects

8.6 Characteristics of moulding sands

8.7 Working with Plastics; Extrusion, Calendering etc.

9.0 Maintenance **(3 hrs)**

9.1 Introduction, Objectives of Plant Maintenance

9.2 Organization of Maintenance Department

9.3 Maintenance Planning

9.4 Types of Maintenance

9.5 Running Repairs, Overhauling

10.0 Automatic Machines & Numerically Control of Machine Tools **(3 hrs)**

10.1 Introduction and Classification of Automatic Machines
10.2 Robots and uses
10.3 Introduction & Classification of NC System
10.4 Working principle of NC Machines, How NC works?
10.5 Advantages of NC Machines
10.6 Recent Trends in Machine Controls
10.7 CNC Machine
10.8 Programming and Numerically Controlled Machining

Workshop Practice; **3 hrs/ Week, 12 Weeks**

Project Work and Report on the following (any two)

i) Bottle Opener
ii) Dust Bin
iii) Book Stand
iv) Pen Holder
v) Gate Clipper With the application of
i) Bench Tools
ii) Metrological Tools
iii) Power Tools
iv) Machine Tools Lathe, Shaper, Milling, Drilling, and Grinding.
v) Gas Welding and/ or, Electric Arc Welding

Works Visit(s)
Industrial Visit(s)

Arrangements to be made with local industries (if available) for students industrial visits. Visits to CNC Machines could also be included.

Recommended Books:

1. Shop Theory, J. Anderson and E.E. Tatro, McGraw Hill.
2. A Course in Workshop Technology Volume I & II, Prof. B.S. Raghubanshi, Dhanpat Rai & Sons, Delhi
3. Workshop Technology Volume I & II, H.S.Bawa, Tata McGraw Hill Publishing Company Limited, New Delhi
4. A Course in Workshop Technology Volume I & II, Hazra & Choudhary
5. Machine Shop Operations and Setups, O.D. Lascoe, C.A. Nelson and H.W.Porter, American Technical Society.
6. Machine Shop Practice Volume I & II, Industrial Press, New York.
7. Techniology of Machine Tools, K. Oswald, McGraw Hill.
8. Machinery's Hand Book, Oberg, Jones and Horton, Industrial Press.
9. CNC Machines

COMMUNICATIVE ENGLISH
BEG105SH

Year :I **Semester :I**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3		1	3	80	--	--	20	--	100	

Course Description :

This course is designed for the students of B.E. level: first year, first semester of Purbanchal University who have completed either Diploma level in Engineering or I.Sc. or + 2 from any institution recognized by this university. It intends to develop and strengthen in students the basic and communicative skills in the English language with emphasis on speaking, reading and writing.

Course objectives:

This course intends to develop:

- skills needed for group discussion, meeting conduction and technical talk.
- intensive and extensive reading skills in technical and non - technical reading materials.
- skills in writing description, official letters and letters of application, proposals and formal technical reports.

Course in detail:

Unit 1 : Oral communication 16

A. Fundamentals of effective speaking :
posture, gesture, facial expression, voice, eye contact, space distancing etc.

B. Group discussion on subjects of general and technical interest.

C. Meetings
   a. Notice preparation
   b. Agenda preparation
   c. Minutes preparation
   d. Meeting conduction

D. Technical talk
   a. Writing complete manuscript for technical talk.
   b. Presenting technical talk based on manuscript.
   c. Preparing note for technical talk.
   d. Presenting talks based on notes.

Unit 2: Reading : Intensive and Extensive 14

A. Intensive Reading :
   a. How to tackle intensive reading materials.
   b. Practicing comprehension on prescribed texts.
   c. Note making and summary writing.
   d. Practice on contextual grammar.

B. Extensive Reading:
   a. How to tackle extensive reading materials.
   b. Practicing extensive reading.

Unit 3: Writing 26

A. Fundamentals of effective writing.
   unity, coherence, conciseness, clarity.

B Description Writing.
   mechanical, electrical or electronic objects, tables, graphs, charts, landscape, technical process

C. Letters
   a. Official Letters
      i. Standard letter formats.
      ii. Writing letters for asking and giving information giving instruction, letters of request, apology and explanation, complaint and order.
   b. Letters of application
      i. Standard format
      ii. Preparing Bio-data and Resume
      iii. Writing letters of application

D. Proposal Writing
   a. Format for technical proposals
   b. Writing technical proposals

E. Technical Report Writing
   a. Format for technical reports
   b. Writing technical reports

Prescribed Book:

1. English for Engineers and Technologist 2
   Orient Longman, Anna University, Chennai 1990,(Reading and language focus all and oral and writing as mentioned in the syllabus)

References:

1. Adhikari Usha, et, al. Communicative Skills in English, Research training unit,
   Department of Science and Humanities, Institute of Engineering, Pulchowk Campus 2002.
2. Anne Eisenberg, Effective Technical Communication, Mc. Graw- Hill, 1982.

3. K.W Houp and T.E pearsall, Reporting Technical Information, 5th Edition Macmillian Publishing Company, New York, 1984.
4. Leech, G, Savartivk, J. , A Communicative Grammar of English, ELBS 1975
5. Collins Cobuild English Dictionary, New Edition, Harper Collins Publishers 1995.

COMPUTER PROGRAMMING I

BEG175CO

Year: I **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**
**** Duration:** 3 hours

Course objectives: To provide fundamental knowledge of programming.

1. Problem Solving Using Computers **2**
- 1.1 Problem Analysis
- 1.2 Algorithm Development & Flowcharting
- 1.3 Coding
- 1.4 Compilation & Execution
- 1.5 Debugging & Testing
- 1.6 Program Documentation

2. Introduction to C **2**
- 2.1 Historical Development of C
- 2.2 Importance of C
- 2.3 Basic Structure of C Programs
- 2.4 Executing a C Program

3. C Fundamentals **3**
- 3.1 Character Set
- 3.2 Identifiers & Keywords
- 3.3 Data Types
- 3.4 Constants, Variables
- 3.5 Declarations
- 3.6 Escape Sequences
- 3.7 Preprocessors Directives
- 3.8 Typedef statement
- 3.9 Symbolic Constants

4. Operators & Expression **1**
- 4.1 Operators:
  - 4.1.1 Arithmetic, Relational ,Logical, Assignment, Unary, Conditional, Bit wise operators
- 4.2 Precedence & Associativity

5. Input and Output **2**
- 5.1 Types of I/O
- 5.2 Reading & Writing data
- 5.3 Formatted I/O

6. Control Statements **6**

- 6.1 Loops: For, While, Do-While
- 6.2 Decisions: IF , IF ELSE, Nested IF…ELSE
- 6.3 Statements: switch, break, continue, goto
- 6.4 exit( ) function

7. Functions **6**

- 7.1 Advantages of using Function
- 7.2 User Defined & Library Functions
- 7.3 Function Prototypes, definition & return statement
- 7.4 Call by Value & Call by reference
- 7.5 Concept of Local, Global & Static variables
- 7.6 Recursive Function

8. Arrays and Strings **6**

- 8.1 Introduction
- 8.2 Single and Multi-dimension arrays
- 8.3 Processing an array
- 8.4 Passing arrays to Functions
- 8.5 Arrays of Strings
- 8.6 String Handling Function

9. Pointers **5**

- 9.1 Fundamentals
- 9.2 Pointer Declarations
- 9.3 Passing Pointers to Functions
- 9.4 Relationship between Arrays & Pointers
- 9.5 Dynamic Memory Allocation

10. Structures and Unions **6**

- 10.1 Defining a Structure, Arrays of Structures, Structures within Structures
- 10.2 Processing a Structure
- 10.3 Structures & Pointers
- 10.4 Passing Structures to Functions
- 10.5 Union & its importance

11. Data Files **3**

- 11.1 Opening & Closing a Data File
- 11.2 Creating a Data File
- 11.3 Processing a Data File

12. Graphics **3**

- 12.1 Initialization
- 12.2 Graphical mode
- 12.3 Simple program using built in graphical function

Laboratories:

There shall be 12 lab exercises covering features of C programming.

References:

1. Kelly & Pohl, " A Book on C ", Benjamin/Cummings
2. Brian W. Keringhan & Dennis M. Ritchie, " The 'C' Programming Language",PHI
3. Brtons G. Gotterfried, "Programming with 'C'", Tata McGraw-Hill
4. Stephen G. Gotterfried, "Programming in C", CBS pubishers & distributors
5. E. Balguruswamy, "Programming in C", Tata McGraw-Hill
6. Yashvant Kanetkar, "Let us C", BPB Publications

MATHEMATICS II
BEG102SH

Year :I **Semester :2**

Teaching Schedule Hours/ Week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3		2	3	80	--	--	20	--	100	

Objectives: The basic objective of the course is to provide a sound knowledge of vectors, 3-D analytical geometry, Infinite series and ordinary differential equations.

1. Analytic geometry of 3-D: Planes, Straight lines, Standard equation of sphere, cylinder and cone. 14

2. Infinite Series: Infinite series and sequences, convergence, ratio, root and integral tests, absolute convergence, power series, radius of convergence. 6

3. Plane curves and polar coordinates: Plane curves, parametric equations, polar coordinates, integral in the polar coordinates. 4

4. Vector Calculus: Differentiation and Integration of vectors, gradients, divergence and curl. 8

5. Differential Equations: First order differential equation, variable separation, homogeneous, linear and exact. Second order differential equations, linear equations with constant coefficient, homogeneous equation with constant coefficients, general solutions, initial value problems, non-homogeneous equations, solutions in series, Legendre, Bessel equations. 13

Recommended books:

1. Three-dimensional Geometry – Y. R. Sthapit and B.C. Bajracharya.
2. Algebra - G.D. Pant
3. A text book of vector Analysis – M.B. singh and B.C. Bajracharya
4. Integral Calculus and Differential Equations – G.D. Pant & G.S. Sth
5. Calculus and Analytic Geometry – Thomas and Finney, Narosa Publication House, India.
6. Advanced Engineering Mathematics – E. Kreyszig, 5th Edition, Wiley, New York.

OBJECT ORIENTED PROGRAMMING IN C++

BEG176CO

Year: I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	-	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course objectives: To provide fundamental knowledge of object oriented programming.

1.0 Overview **3**

- 1.1 Comparing Procedural Programming & Object-Oriented Programming Paradigm
- 1.2 Characteristics of Object-Oriented Languages
  - 1.2.1 Objects
  - 1.2.2 Classes
  - 1.2.3 Inheritance
  - 1.2.4 Reusability
  - 1.2.5 Creating new data types
  - 1.2.6 Polymorphism and Overloading
- 1.3 Application & benefits of using OOP

2.0 C++ Language basic syntax **2**

- 2.1 Derived Types
- 2.2 Standard conversions and promotions
- 2.3 Arrays and pointer in C++
- 2.4 New and Delete operators
- 2.5 const
- 2.6 Enumeration
- 2.7 Comments

3.0 Functions in C++ **3**

- 3.1 Functions overloading
- 3.2 Default arguments
- 3.3 Inline functions

4.0 Classes and Objects **7**

- 4.1 Introduction
- 4.2 Class Specification: data encapsulation (public, protected, private modifiers)
- 4.3 Class Objects
- 4.4 Accessing Class members
- 4.5 Defining Member Function
  - 4.5.1 Member Function Inside the Class Body

10.3.2 Declaring a Namespace

10.4 Exceptions
10.4.1 Introduction to Exceptions
10.4.2 Exception Handling Model
10.4.3 Exception Handling Construct: try, throw, catch

Laboratories:

There shall be 12 lab exercises covering features of Object-Oriented Programming. By the end of this course each student must complete a major programming project based on OOP.

References:

1. Robert Lafore, "Object-Oriented Programming in C++", Galgotia Publication, India
2. Deitel & Deitel, "C++ How to Program", 3/e, Prentice Hall
3. Navajyoti Barkakati, "Object-Oriented Programming in C++", Prentice Hall of India
4. Venugopal,Rajkumar & Ravishankar, "Mastering C++", Tata McGraw-Hill Publication, India

ELECTRO ENGINEERING MATERIAL

BEG122EL

Year: I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**		20	-	80	-	100

*** Continuous**

**** Duration:** 3 hours

Course Objectives: The objectives of this course to understand the properties of dielectric materials in static and alternating fields, to understand the properties of insulating and magnetic materials, and to understand the properties of conductors and semiconductors.

1 Theory of Metal 10 Hours

1.1 Elementary Quantum Mechanical Ideas. De Broglie's Equation, Einstein's Equation, Heisenberg's Uncertainty Principal

1.2 Free Electron Theory, Energy Well Model of a Metal

1.3 Bond Theory of Solids, Electron Effective Mass, Energy Bands, Density of States

1.4 Collection of Particles, Boltzmann Classified Statistics , Fermi-Dirac Distribution Function

1.5 Fermi Energy, Metal –Metal Contact, The Seeback Effect and The Thermocouple

1.6 Thermionic Emission , Richardson – Dushman Equation , Field Assisted Emission, The Schottky Effect, Work Function

2 Free Electron Theory of Conduction In Metals 8 Hours

2.1 Thermal Velocity of Electron

2.2 Electron Mobility, Conductivity, Resistivity

2.3 Diffusion of Electron, Diffusion's Coefficient , Einstein's Relationship Between Mobility and Diffusion Coefficient

2.4 Chemical and Physical Properties of Common Conducting Materials [Ag , Cu, Al, Mn, Ni, Etc]

3 Conduction in Liquid And Gases 3 Hours

3.1 Ionic Conduction in Electrolytes

3.2 Electrical Conduction in Gases, Electric Break Down

4 Magnetic Materials And Superconductivity 11 Hours

4.1 Magnetization of Matter, Magnetic Dipole Moment, Atomic Magnetic Moment Magnetisation Vector M, Magnetic Permeability and Susceptibility, Magnetising Field or Magnetic Field Intensity, H

4.2 Magnetic Material Classification, Diamagnetism, Paramagnetism, Ferromagnetism, Ferrimagnetism, Antiferromagnetism

4.3 Magnetic Domain Structure, Magnetic Domains, Domains Walls, Domain Wall Motion
4.4 Soft and Hard Magnetic Materials: Their Examples And Application
4.5 Superconductivity: Zero Resistance and Meissner Effect, Type I, Type II Superconductors, Critical Current Density

5 Dielectric Materials 8 Hours

5.1 Mater Polarisation and Relative Permittivity → Relative Permittivity Dipole Moment and Electronic Polarisation, Polarisation Vector P Local Field E_{IOC} And Clausius – Mossotti Equation
5.2 Polarisation Mechanism : Electronic Polarisation, Ionic Polarisation, Orientational Polarisation, Interfacial Polarisation, Total Polarisation
5.3 Dielectric Contract and Dielectric Losses Frequency and Temperature Effects
5.4 `Dielectric Strength and Breakdown : Dielectric Strength Dielectric Breakdown and Partial Discharge in Gases Dielectric Breakdown in Solids,
5.5 Ferro-Electricity and Piezoelectricity
5.6 Properties of Common Dielectric Materials Like Glass, Porcelain,Polyethylene , PVC, Nylon, Bakelite, Mica, Transformer Oil, Paper etc

6 Semi-Conducting Materials 18 Hours

6.1 Electron and Holes Conduction in Semiconductor, Electron and Hole Concentration
6.2 Extrinsic Semiconductor: N Type Semiconductor, P- Type Semiconductor, Compensation Doping, Energy Band Diagram for Uniformly Doped and Graded P and N Type Materials
6.3 Generation and Recombination of Electrons and Holes, Concept of Lifetime,
6.4 Diffusion and Conduction Equations Mobility and Diffusion Coefficients or Electron and Holes, Steady State Diffusion and Continuity Equation
6.5 Ideal PN Junction: No Bias, Forward Bias, Reverse Bias, PN Junction Band Diagram, Open Circuit [No Bias] Forward and Reverse Bias Metal Semiconductor Contact

Reference Book

1. R.A Colcaser and S.Diehl-Nagle, “Materials and Devices for Electrical Engineers and Physicists, McGraw-Hill, New York, 1985.
2. R.C. Jaeger, “Introduction to Microelectronic Fabrication –Volume IV”, Addison – Wesley Publishing Company, Inc, 1988.
3. S O Karsap Principal of Electrical Engineering Device , Mcgraw Hill 2000
1.

APPLIED MECHANICS

BEG150CI

Year: I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**-**	20	-	80	-	100

*** Continuous**

**** Duration:** 3 hours

Course objectives: To provide an understanding of mechanical system and of laws of motion for application to a wide range of engineering problems.

1. **Introduction** **3**
   - 1.1 Definition & scope of Eng. Mechanics.
   - 1.2 Concept of particles, rigid body, deformed & fluid bodies.
   - 1.3 Eqn of static equilibrium in 2D & 3D.
   - 1.4 Free body diagram (definition , importance & examples)
   - 1.5 Significant figures for calculations
   - 1.6 System of units.

2. Vector. **3**
   - 2.1 Introduction (Vector & scalar quantities, simple operation of vectors & their laws, position vectors)
   - 2.2 Unit vectors in Cartesian coordinates
   - 2.3 Dot product (Definition, laws &applications)
   - 2.4 Cross product (Definition, laws &applications)
   - 2.5 Scalar triple vector, vector triple product (No derivation)

3. Forces **5**
   - 3.1 Definition & principles of forces.
   - 3.2 Types of forces (caplaner, Collinear, concurrent, parallel, external & internal forces)
   - 3.3 Principle of transmissibility & its limitations.
   - 3.4 Resolution & composition of forces.
   - 3.5 Lami's theorem, Viragnon's theorem, triangle parallelogram & polygon law of forces
   - 3.6 Moment of forces about a point & axis (In scaler & vector form)
   - 3.7 Definition of couples & prove it as free vector.

4. Distributed force **4.5**
   - 4.1 Definition & Derivation of centre of gravity & centroid. (composite figure & Direct Integration)
   - 4.2 Centroids of lines, areas, volumes
   - 4.3 Definition of second moment of area & moment of Inertia and Radius of gyration

4.4 Parallel and perpendicular axis theorem, MOI of common figures (eg rectangle, triangle, circle, ellipse) and uniform thin rod.
4.5 MOI of Built up section.
4.6 MOI by Direct integration method.

5. Friction: 3

5.1 Introduction (definition , Types, cause & effect)
5.2 Laws of Dry friction
5.3 Static friction, co- efficient of friction & angle of friction
5.4 Condition of sliding or tipping.
5.5 Application to static problems (Inclined plane & ladder)

6. Introduction to Structural analysis 8

6.1 structural components (Beam ,frame truss, 2D plate, cable , Arch ,grid)
6.2 Plane & space structures.
6.3 Difference between Mechanism & structure.
6.4 Types of loading & Supports.
6.5 Determinancy (internal & external) & stability (Statical & geometrical) of beam, frame & truss.
6.6 Internal & External forces in beam, frame & truss.
6.7 Definition & sign convention of axial force shear force & Bending moment.
6.8 Relationship between Load, shear force & B. Moment.
6.9 Axial force, shear force & bending moment diagram for Beam.
6.10 Analysis of truss, (by method of joints & method of sections)

7. Introduction to fluid statics. 2.5

7.1 Definition of hydrostatics.
7.2 Intensity of pressure & total pressure on horizontal, vertical & inclined immersed surfaces.
7.3 Centre of pressure for vertical & inclined immersed surfaces.
7.4 Pressure diagram for (liquid on one side and liquid over another on one side and liquid on both sides)

8.0 Kinematics of particles. 2.5

8.1 Rectilinear, curvilinear & plane curvilinear motion of a particle.
8.2 Uniformly accelerated motion.
8.3 Rectangular, normal & tangential components of acceleration.
8.4 Projectile Motion.

9.0 Kinetics of particles. 3

9.1 Newton's laws and equations of motions, dynamic equilibrium.
9.2 Applications of Newton's 2nd law for rectangular normal & tangential components.
9.3 Work power efficiency & work energy principle.
9.4 Principles of impulse & momentum (linear & angular)

10.0 Kinematics of rigid bodies. 2.5

10.1 Motion of rigid bodies (translation, rotation & general plane motion)
10.2 Relative velocity & acceleration.
10.3 Applications to rigid bodies, simple Mechanism & linkage.

11. Force analysis for Rigid bodies. 3

11.1Equation of motion
11.2Need for moment of inertia.
11.3Translation, pure rotation & general plane motion
11.4Constrained motion in plane.

12. Plane motion of rigid bodies: Energy & Momentum Methods. 5

12.1Kinetic Energy
12.2Potential Energy: gravitational force & elastic elements.
12.3Work by internal forces (eg. Applied loads, frictional force)
12.4Conservative & non- conservative system.
12.5Conservation of linear & angular Momentum
12.6Impulsive motion & eccentric impact.

Recommended books

: "Engineering Mechanics-Statics and Dynamics" Shames, I.H, 3rd ed., New Delhi,
Prentice Hall of India, 1990.

: "Mechanics for Engineers – Statics and Dynamics" F.P. Beer and E.R. johnston, Jr
4th Edition, Mcgrw-Hill, 1987.

CHEMISTRY

BEG104SH

Year :1 **Semester :2**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3	2/2	1	3	80	3	25	20	--	125	

Group A (Physical)

Unit 1: - Review leactures on Bohr theory and summer field Theory 8 hrs

- Defrog lie eqn.
- Hesenberg uncertainty principle
- Wave Mechanical Model of an atom
- Quanttaum No.
- Aufbou principle shapes of s, p, d orbitals.
- Paulis exeliesion principle, Hund's Rule of Maxm multipli –city eleatronic confn of elements using s,p,d and forbitals.
- Stability of half folled and completely fooled orbitals.

Unit 2: - Chemical bonding: - (6 hrs)

- Electrovalent , eovalent and coordinate covalent bond
- Hybridization , Metallic bond , hydrogen bonding, VSEPR
- Theory , vander waals forces trus , covalent Net Working
- Crystal lattice, types of crystal.

Unit 3 :- Electrochemistry (10 hrs)

- Strong and weak electrolytes
- Ostwald dilution law and its limitation.
- PH and PH scale
- Common ion effect in ionic equilibria
- Buffer and PH of buffer
- Electrolytic cell and galvanic cell
- Single electrode potential and normal hydrogen electrode , electro chamical serres.
- Nernst eqn and and determination of electrode Potential and cell potential under non standard conditions.
- Corrosions of metal and its prevention

Unit 4:- Introductory Thermodynamics:- (8 hrs)

- Internal energy enthalpy first law of thermodynamics
- Relation betn enthalpy change and change in enternal energy .
- Enthaspy of a reaction
- Exothermic and endothermic rxn
- Hess's law of constant heat summmation
- Enthalpy change from bond energy
- Molar heat copacities, relation betn cp and cv.

Variation of heat of rxn with temp. (kirchoff's eqns) calorific values of foods and feels

Group B (inorganic)

Co- ordination complexes :- (5 hrs)

- Double salt and complex salt
- Werner's co- ordination Theory
- Nomenclature of co- ordination complexes
- Electronic interpretation in co- ordination
- Bonding in coordination compels only valence bond theory
- Appln of valence bond Theory octahednal complexes, tefrohednal complexes and square planer complexes
- Appln of co- ordination complexes

Unit 6:- Transition elements 6 hrs

Transition elements and their position in periodic table

- characterstics properties of third transition metals with reference to
- a) Electronic Confrgunation b) Metallic Character c) variable valency d) Complex formation e) Magnetic properties f) Alloy formation g) Catalytic activity h) colour

Unit 7 Silicones properties and uses (1 hrs)

Unit 8 Environmental Chemistry (4 hrs)

- Introduction to environment
- Types of pollution – Air, water, soil and noise and their possible remedies.

Group C (organic)

Unit 9 :- Types of organic Rxn (4 hrs)

- Substitution Rxn (SN1 and SN2 type)
- Addition Rxn
- Elimination Rxn (E1 and E2 Rxn)
- Rearrangement rxn

Unit 10 Stereochemistry (3 hrs)

- Types of stereo isomerism
- Optical and Geometrical isomerism

Unit11:- Organsmetalic compds :Prep^{n} Props and uses of grignard reagent (1hrs)

Unit12:-Explosives (1hrs)

-Simple idea about low and high explosives

-TNT, TNG and nitro cellulose prep^{n} and uses

Unit:13- Polymers and polimerization (3hrs)

-Types of polymerization rx^{n}

-Types of polymers

-Synthetic fibres polystyrene ,teflon, terylene or dacrou

Recommended Books:-

1) Selected topics in physical chemistry- Motikaji Sthapit
2) Principles of physicals chemistry- Marron & Prutto
3) Essentials of physical chemistry- Bahl & Tuli
4) Advanced inorganic chemistry –Satyaprakash ,R.D. Madan, G.D.Tuli
5) Concise chemistry-J.D. Lee
6) Organic chemistry-Morrison & Boyd
7) Organic chemistry – B.S. Bahl

Practical Works in Chemistry:-

1. To determine the alkalinity of the given sample of water (Two practical)
2. To determine the hardness of water sample.
3. To determine the PH of different aqueous solutions using PH meter and prep^{n} standard buffer solution acidic
4. To determine the amount of free chlorine in the given sample of water.
5. To determine the condition in which corrosion takes place.
6. To measure the quantity of charge required to deposit one mole of copper.

ENGINEERING DRAWING II

BEG147ME

Year :1 **Semester :2**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
1	3	0	3	80	--	--	20	--	100	

Course Objectives: To develop a good understanding of isometric and orthographic projection drawings, assembly & disassembly drawing of machine components and other basic engineering drawings in civil, electronic, electrical and geographical.

1.0 Pictorial Projections (8 hrs)

1.1 Introduction; Characteristics, advantages and disadvantages
1.2 Axonometric Projection; Isometric drawing, Dimetric and trimetric drawing
1.3 Oblique Projection
1.4 Perspective Projection

2.0 Design and Production Drawings-Machine Drawing (12hrs)

2.1 Introduction; Production of complete design and assembly drawings
2.2 Fundamental Techniques; Size and location dimensioning; Placement of lines and general procedures Standard dimensioning practice (SI system)
2.3 Limit Dimensioning; Nominal and basic size, allowance, tolerance, limits of size, clearance fit, interference fit Basic hole system and shaft systems
2.4 Threads and Standard Machine Assembly Elements; Screw threads; ISO standards, representation and dimensioning Fasteners; Types and drawing representation Keys, Collars, joints, springs, bearings

2.0 Assembly & Disassembly drawings of machine components - machine drawing (18hrs)

3.1 Assembly Drawings; Drawing layout, bill of materials (BOM), drawing numbers
3.2 Disassembly Drawings Drawing lay out, BOM, product structure tree (PST)

4.0 Welding and Riveting (4 hrs)

4.1 Representing Joints and Welds for Gas, Arc and Resistance Welding; Types: Spot, Seam, Flash, Fillet, Back-back, surface and upset welds.
4.2 Drawing Symbols for Welds
4.3 Rivets and Riveted Joints; Types and drawing representation

5.0 Piping Diagrams (4 hrs)

5.1 Piping, Tubing and Types of Joints
5.2 Specification of Threads, Fittings and Valves
5.3 Standard Piping Symbols
5.4 Piping Drawings and Symbolic Diagrams

6.0 Other Engineering Drawings (10hrs)

5.1 Civil Drawings Steel Construction, Wood Construction, Concrete construction, Masonry and Stone Construction
5.2 Electrical and Electronic Diagrams Standards Types of Diagrams; Line diagram, schematics and pictorials Symbols for

Components Printed Circuits, Integrated circuits

5.3 Geographical Drawings Topographical Maps, Cadastral Maps, Engineering Maps

5.4 Graphs, Charts and Nomograms Rectangular Coordinate Graphs, Charts, Nommograms

5.5 Duplicating and Reproduction of Engineering Drawings Blue prints, Brown Prints and Blue-Line prints Duplicate Tracings, Photocopies

7.0 Computer Software used in Drawings (4 hrs)

7.1 An introduction to AutoCAD (Computer Aided Design)

7.2 An introduction to Geographical Information System (GIS)

LABORATORIES: 3hrs/ week, 12weeks

1. Isometric and Oblique Drawings
2. Oblique Drawing, Perspective Drawing
3. Machine Drawings; Sizing and dimensioning
4. Machine Drawing; Detail drawings, dimensioning and tolerance
5. Machine Drawing; Assembly drawing
6. Machine Drawing; Assembly drawing (Cond.)
7. Machine Drawing; Assembly drawing (Contd.)
8. Machine Drawing; Disassembly Drawings
9. Machine Drawing; Disassembly Drawings (Contd.)
10. Threads and Fasteners
11. Welding, Joining and Piping
12. Structural Drawing
13. Electrical and Electronics Diagrams
14. Topographical and Engineering Maps, Graphs, Chart and Nomograms and Drawing Reproduction of Drawings.
15. Machine Drawing by using AutoCAD 2000.
16. Building Drawing by using AutoCAD 2000.

Recommended Books:

1. "Fundamentals of Engineering Drawing ", W.J. .Luzadder, prentice Hall, 8th Edition,1981
2. "Engineering Drawing and Graphic Technology" T.E.French, C.J.Vierck and R.J. Foster, Mc Graw Hill, 1981
3. "Technical Drawing'', F..E.Giesecke, A. Mitchell, H.C.Spencer and J.C. Dygdone, Macmillan,8th Edition,1986
4 Machine Drawing
5 "Text book of Engineering Drawing" Gurucharan Singh and Jagdishlal
6 "Auto CAD 2000" George Omura

ELECTRICAL ENGINEERING I

BEG123EL

Year: I **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: This course serves as the foundation course on Basic Electrical Engineering. After the completion of this course, students will be able to Analyze A.C.&D.C Electric Circuits.

1.0 D. C. Circuit Analysis (9 hours)

1.1 Concept of electric charge and current. Ohm's law its application and limitation.
1.2 Electric circuit, circuit elements
1.3 Resistance inductance and capacitance, their functional behavior, constructional features, mathematical descriptions
1.4 Introduction to voltage source and current source
1.5 Series and parallel connection of resistors
1.6 Series and parallel connection of sources effect of their internal resistance on the circuit characteristics
1.7 Star / delta transformation,
1.8 Power and energy in d.c. circuit

2.0 Circuit analysis (16 hours)

2.1 Kirchoff's laws-current law and voltage law, application, limitations Superposition theorem reciprocity theorem
2.2 Maxwell's loop current method
2.3 Nodal analysis of electric circuit
2.4 Thevenin's theorem
2.5 Norton's theorem
2.6 Matrix methods for electric circuit analysis;

3.0 A.C circuit (10 hours)

3.1 Faraday's law of Electro magnetic induction, Generation of sinusoidal alternating emf, terminologies used in a.c circuit.
3.2 Sinusoidal ac, emf, phasor representation of a.c, j-operator and it use in a.c circuit,
3.3 R, L and C excited by a.c source, R-L, R-C, R-L-C series circuits, parallel a.c. circuit, Resonance in series and parallel R-L-C circuit, construction of phasor diagrams (vector diagrams)
3.4 Power and power factor in a.c circuit – Instantaneous and average power real, reactive and apparent power

4.0 Three Phase a. c. Circuit (6 hours)

4.1 Generation of three phase a.c. emf wave form representation, use of j-operator star and delta connection of source and load, line voltage and line current, phase voltage

and phase current, balanced three phase system, calculation of current and voltage, measurement of power, three phase four wire system.

Labs

1. Basic electrical measurements and verification of ohms law.
2. Series and parallel connection of resistors, verification of kirchoffis laws
3. Measurement of Power in DC. Circuit using Wattmeter.
4. Measurement of power in single phase ac circuit using wattmeter.
5. Measurement of rms value, amplitude value, power factor by using oscilloscope.
6. Measurement of power in three phase ac circuit.
7. Series, resonance and parallel resonance.

References:

1. S.N. Tiwari And A.S. Gin Saroor, " A First Course In Electrical Engineering", A. H. Wheeler And Co.Ltd, Allahabad, India.
2. B. L. Theraja And A. K. Theraja, " A Test Book Of Electrical Technology" S. Chand And Company Ltd., New Delhi, India.
3. V. Del Toro, "Principles Of Electrical Engineering", Prentice-Hall Of India, Ltd. New Delhi.
4. I.J. Nagrath, " Basic Electrical Engineering", Tata McGraw Hill, New Delhi.
5. P. S. Bhimbra, Electric Machinery, Khanna Publishers, New Delhi.

BE Second Year Detail Semester

2nd Year 1st Semester

&

2nd Year 2nd Semester

MATHEMATICS III
BEG201SH

Year :II **Semester :1**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
3		2	3	80	--	--	20	--	100	

Objectives: The Purpose of this course is to round out the student's preparation more sophisticated applications with an introduction of linear algebra, a continuous of the study of ordinary differential equations and an introduction to vector algebra.

1.0 Matrices and Determinant. **15**

1.1 Matrix and Determinant
1.2 Vector Spaces
1.3 Linear transformation
1.4 System of linear equations, Gauss elimination
1.5 Rank matrix inverse
1.6 Eigen value eigen vectors applications.

2.0 Laplace Transformation **9**

2.1 Laplace transforms
2.2 Standard transforms
2.3 Inverse Laplace transforms
2.4 Application to differential equations

3.0 Line Integration **6**

3.1 Definition of Line Integration
3.2 Evaluation of line integration
3.3 Double Integration
3.4 Transformation of double integrals into integrals rails beta gamma fun. Diritchet integral.

4.0 Surface integrals and volume integrals **7**

4.1 Surfaces
4.2 Tangent planes, first fundamental form and area
4.3 Surface integrals
4.4 Volume integrals, Diritehlet integrals

5.0 Integral Theorems **8**

5.1 Greens theorem in the plane
5.2 Triple integrals and divergence theorem of Gauss
5.3 Cpmsequences and applications of the divergence theorems

5.4 Stoke's theorem
5.5 Consequences and applications of Stoke's Theorem
5.6 Time Integrals and independence of path

Recommended books:

7. E. Kreyszig, Advanced Engineering Mathematics –, 5th Edition, Wiley, New York.
2. MN Guterman and ZN Niteeki, Differential equations a first course, 2nd Edition, Saunders, New York.

THERMODYNAMICS, HEAT AND MASS TRANSFER

BEG240ME

Year: II **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course objective: To provide a basic understanding of thermodynamics, heat transfer and fluid flow

2.0 Energy and the First Law: (3 hours)

2.1 Systems and energy conservation
2.2 Energy transfer as work and heat
2.4 Energy balance for a control mass, examples for no flow and steady flow systems

3.0 Properties and States of Substances: (4 hours)

3.1 Simple substances and equations of state
3.2 General nature of a compressible substance
3.3 Metastable states in phase transition
3.4 Physical properties and engineering analysis
3.6 The perfect gas
3.7 The simple magnetic substance

4.0 Energy Analysis: (2 hours)

4.1 General methodology
4.2 Examples of control mass energy analysis and volume energy analysis

5.0 Entropy and Second Law: (3 hours)

5.1 Concept of entropy
5.2 Reversible and irreversible processes
5.3 Entropy as a function of state
5.4 Applications of energy conversion

6.0 Characteristics of Thermodynamic Systems: (3 hours)

6.1 The carnot cycle
6.2 Process models
6.3 Use of the Rankine cycle
6.4 Vapour refrigeration systems
6.5 Power systems

7.0 Introduction to Heat Transfer: (9 hours)

7.1 Basic concepts and models of heat transfer
7.2 The conduction rate equation and heat transfer coefficient
7.3 Conduction: insulation, R values, electric analogies; overall coefficient for plane walls, cylinders and fins; conduction shape factor; transient heat conduction
7.4 Free and forced convection: laminar and turbulent boundary layers; flat plates, tubes and fins; cross flow and application to heat exchangers
7.5 Radiation: radiation properties for black and gray bodies; applications; earth-atmosphere system; radiant heating systems
7.6 Heat transfer applications in electronics and electrical engineering: finned heat sinks for electronic applications, forced air cooling of electronic instrumentation, cooling of electric equipment such as transformers, motors, generators, power converters

8.0 Fluid: (2 hours)

8.1 Definition of a fluid
8.2 Viscosity
8.3 Density: specific gravity, specific volume
8.4 Bulk modulus
8.5 Surface tension

9.0 Fluid Statics: (4 hours)

9.1 Pressure variation in static fluids
9.2 Pressure measurement: units and scales
9.3 Forces on plane and curved submerged surfaces
9.4 Buoyant force
9.5 Stability of floating and submerged bodies

10.0 Fluid Flow: (4 hours)

10.1 Types of flow and definitions, The continuity equation
10.3 Streamlines and the potential function
10.4 The Bernoulli energy equation
10.5 The momentum equation
10.6 Applications

11.0 Viscous Flow: (4 hours)

11.1 Turbulent and laminar flow, Reynold's number
11.2 Velocity distribution
11.3 Boundary layer
11.4 Drag on immersed bodies
11.5 Resistance to flow in open and closed conduits
11.6 Pressure losses in pipe flow

12.0 Turbo machinery: (5 hours)

12.1 Geometrically similar (homologous) machines

12.2 Performance equations for pumps and turbines

12.3 Configurations and characteristics of turbo machines: axial and centrifugal pumps and blowers, impulse turbines (pelton), reaction turbines (Francis, Kaplan)

12.4 Cavitation

Laboratory:

1.0 Temperature and pressure measurement.
2.0 Compression and expansion of gases and heat equivalent of work.
3.0 Heat conduction and convection.
4.0 Refrigerator and/or heat pump.
5.0 Hydrostatics and properties of fluids: viscous flow in pipes.
6.0 Air flow studies in axial and centrifugal fans
7.0 Turbomachines: Kaplan, Pelton and Francis.

References:

1.0 W.C. Reynolds, "*Engineering Thermodynamics*", McGraw-Hill, 2nd Edition, 1970.
2.0 M.N. ozisik, "*Heat Transfer - A Basic Approach*", McGraw-Hill, 1985.
3.0 de Witt, "*Fundamentals of Heat and Mass Transfer*", Wiley 1985.
4.0 Saberski, Acosta and Hauptmann, "*Fluid Mechanics*".

DIGITAL ELECTRONICS

BEG230EC

Year: II **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course objectives: to provide fundamental of Digital Electronics digital computer design and application of digital devices.

1. Binary Systems **4 Hours**

1.1 Digital Systems
1.2 Binary Numbers
1.3 Number Base Conversion
1.4 Integrated circuits

2. Boolean Algebra and Logic gates **5 Hours**

2.1 Basic Definition
2.2 Boolean algebra and functions
2.3 Logical Operator
2.4 Digital Logic Gates
2.5 IC Digital Logic Gates

3. Combination Logic **5 Hours**

3.1 Design procedure
3.2 Adders
3.3 Subtractors
3.4 Code Conversion
3.5 Analysis Procedure
3.6 Multilevel NAND and NOR Circuits
3.7 Exclusive-OR and Equivalence Function

4. Combination Logic with MSI and LSI **5 Hours**

4.1 Binary parallel adder
4.2 Decimal Adder
4.3 Magnitude Comparator
4.4 Decoders
4.5 Multiplexers
4.6 Read Only Memory
4.7 Programmable Logic Array (PLA)

5. Sequential Logic **6 Hours**

5.1 Flip-Flops
5.2 Triggers
5.3 Analysis of Clocked Sequential Circuits
5.4 Design of Procedure
5.5 Design of Counters
5.6 Design with State Equations

6. Registers, Counters and The Memory Unit **6 Hours**

6.1 Registers
6.2 Shift Registers
6.3 Ripple Counters
6.4 Synchronous Counters
6.5 Timing Sequences
6.6 The Memory Unit

7. Processor Logic Design **6 Hours**

7.1 Processor Organization
7.2 Arithmetic Logic Unit
7.3 Design of Arithmetic Circuit
7.4 Design of Logic Circuit
7.5 Design of Arithmetic Logic Unit
7.6 Design of Shifter, Status Register

8. Digital Integrated Circuits **8 hours**

8.1 Bipolar Transistor Characteristics
8.2 RTL and DTL Circuits
8.3 Integrated-Injection Logic
8.4 Transistor-transistor Logic
8.5 Emitter-Coupled Logic
8.6 Metal-Oxide Semiconductor
8.7 Complementary MOS

Laboratory :

The 12 laboratories based on Digital Electronics

1. Familiarization with AND, OR and INVERTER Gates
2. DeMorgan's Law and Familiarization with NAND and NOR gates
3. Familiarization with binary addition and subtraction
4. Construction of true complement generator
5. BCD to Seven segment decoder
6. Encoder, decoder, multiplexer and De-multiplexer
7. Latches, RS, Master-slave and T type flip flops
8. D and J-K type flip-flops
9. Shift Registers,SIPO, PISO

10. Ripple counter, Synchronous counter DODN- counter
11. Familiarization with computer package for logic circuit design
12. Design digital circuits using Electronics Work Bench.

References:

1. William I. Fletcher, " An Engineering Approach to Digital Design", Prentice hall of India, New Delhi, 1990.
2. A.P. Malvino , Jerald A. Brown, "Digital Computer Electronics", 1995.
3. D.A. Hodges and H.G. Jackson, " Analysis and design of Digital Integrated Circuits", McGraw-Hill, New York, 1983.
4. Mano , " Logic and Computer Design Fundamentals", Pearson Education.

ELECTRONIC DEVICES

BEG231EC

Year: II **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To understand the basics and working principles of electronic semiconductor devices and to provide the method for analysis.

1. **Semiconductor Diode**: **(10 hours)**
   - 1.1. Review of conduction in semiconductors
   - 1.2. Theory of p-n junction: Band structure of p-n junction, the p-n junction as a diode, the effects of temperature in V-I characteristics
   - 1.3. Space charge or transition region capacitance and its effects: Diffusion capacitance
   - 1.4. Diode switching times, Zener diode, tunnel diode, construction
   - 1.5. Characteristics, and Applications of Schottky diode, Varactor diode and Metal Oxide Varister.

2. **Bi-polar junction Transistor (BJT):** **(10 hours)**
   - 2.1. Construction of a BJT
   - 2.2. The Ebers-Moll equations
   - 2.3. Current components
   - 2.4. Analytical expression for transistor characteristics
   - 2.5. BJT switching time, Maximum voltage rating, Avalanche effect, Reach-through
   - 2.6. The transistor as an amplifier, CB, CE, and CC configurations

3. **BJT biasing and thermal stabilization**: **(4 hours)**
   - 3.1. Types of biasing
   - 3.2. Bias stability: Bias compensation
   - 3.3. Thermal runway and stability

4. **The Small signal low frequency analysis model of BJT**: **(5 hours)**
   - 4.1. Low frequency hybrid model
   - 4.2. Transistor configurations and their hybrid model: measurement of h-parameters
   - 4.3. Analysis of a transistor amplifier circuit using h-parameters.

5. **The high frequency model of BJT**: **(4 hours)**
   5.1. High frequency model (t-model)
   5.2. Transistor configurations and their high frequency model
   5.3. High frequency current gain

6. **The Junction Field Effect transistor (JFET)**: **(7 hours)**
   6.1. Construction and types
   6.2. The pinch-off voltage and its importance
   6.3. Biasing and load line: V-I characteristics, Configuration of JFET, Small signal model and analysis
   6.4. A generalized FET Amplifier: Uni-Junction transistor

7. **The metal oxide semiconductor FET**: **(4 hours)**
   7.1. Construction and types
   7.2. Load line and biasing
   7.3. V-I characteristics, small model and analysis

Laboratory:

1. Measurement of characteristics of Diode, Zener diode
2. Measurement of input and output characteristics of CB, CE, and CC configurations
3. Measurement of input and output characteristics of JFET
4. Measurement of input and output characteristics of NMOS
5. Measurement of input and output characteristics of CMOS

References:

1. S. Sedra and KC. Smith, "*Microelectronics Circ***uits**", Holt, Rinehart and Winston Inc., New York
2. MN Horenstein, "*Microelectronic Circuits and Devices*", second edition, Prentice Hall of India
3. J. Milliman and Halkias, "*Electronics Devices and Circuits*", McGraw Hill.

ELECTRICAL ENGINEERING II

BEG223EL

Year: II **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide the basis for formula and solution of network equations and to develop one-port and two port networks with given network functions.

1. **Network analysis**: **(2 hours)**
   1.1. Review of network: Mesh and Nodal-pair

2. **Circuit Equations and the solutions:** **(6 hours)**
   2.1. The differential operator
   2.2. Operational impedance
   2.3. Formulation of circuit differential equations: Complete response (transient and steady state) of first order differential equations with or without initial conditions

3. **Circuit Dynamics**: **(6 hours)**
   3.1. First order RL and RC circuits
   3.2. Complete response of RL and RC circuit to sinusoidal input
   3.3. RLC circuit: Step response of RLC circuits, Response of RLC circuit to sinusoidal inputs, Resonance, Damping factors and Q-factor.

4. **Laplace Transform and Electrical Network solutions**: **(6 hours)**
   4.1. Definition and properties of Laplace transform of common forcing functions
   4.2. Initial and final value theorem
   4.3. Inverse Laplace transform: Partial fraction expansion
   4.4. Solutions of first order and second order system, RL and RC circuit, RLC circuit
   4.5. Transient and steady-state responses of network to: unit step, unit impulse, ramp and sinusoidal forcing functions

5. **Transfer functions**:
   5.1. Transfer functions of network system
   5.2. Poles and Zeros plot and analysis
   5.3. Time-domain behavior from pole-zero locations
   5.4. Stability and Routh's Criteria, Network stability

6. Fourier series and transform: **(3 hours)**
   6.1. Evaluation of Fourier coefficients for periodic sinusoidal and non-sinusoidal waveforms

6.2. Fourier Transform: Application of Fourier transforms for non-periodic waveforms

7. **Frequency response of system** **(4 hours)**
   7.1. Magnitude and phase spectrums
   7.2. Bode plots and its applications
   7.3. Half-power point, bandwidth, roll-off, and skirt, Effects of quality factor on frequency response
   7.4. Concept of ideal and non-ideal LP, HP, BP and BS filters.

8. **One-port passive network:** **(8 hours)**
   8.1. Properties of one-port passive network
   8.2. Driving point functions: Positive Real Function, loss-less network synthesis of LC one -port network
   8.3. Properties of RL and RC network, Synthesis of RL and RC network
   8.4. Properties and synthesis of RLC one-port network

9. **Two-Port passive network**: **(7 hours)**
   9.1. Properties of two-port network: Reciprocity and symmetry
   9.2. Short circuit and open circuit parameters, transmission parameters, Hybrid parameter
   9.3. Relation and transformations between sets of parameters, Synthesis of two-port LC and RC ladder network

Laboratory:

1. Transient and steady state responses of first order Passive network;
2. Transient and Steady state responses of second order Passive network;
3. Measurement of Frequency responses of first order and second order circuits
4. Measurement of Harmonic content of a waveform
6. Synthesis of one-port network function and verify the responses using oscilloscope.

References:

1 ME. Van Valkenburg "*Network Analysis"*, Third edition Prentice Hall of India, 1995
2. ML Soni, and J.C. Gupta "*A Course in Electrical Circuit Analysis"*, Dhanapat Rai & Sons, India
3. KC Ng *"Electrical Network Theory"*, A.H. Wheeler & Company (P) limited, India

DATA STRUCTURE AND ALGORITHM

BEG273CO

Year: II **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To understand the fundamental concept of data structure. On the completion of this course the student will be able to design data structure and implement it using programming language**.**

1.0 Introduction to data structure (2 hours)

1.1 Concept of data structure and its uses
1.2 Abstract Data Type: Definition and importance
1.3 Implementation of Data Structure

2.0 The Stack (3 hours)

2.1 Stack as an ADT
2.2 Operation in stack, Stack Implementation
2.3 Application: Evaluation of Infix, Postfix, and Prefix expressions

3.0 Queue (3 hours)

3.1 Queue as an ADT, Queue Implementation
3.2 Operations in queue: Enqueue and Dequeue
3.3 Linear and circular queue and their application,
3.4 Priority queue: Definition and application

4.0 List (2 hours)

4.1 Definition
4.2 Static and Dynamic list structure
4.3 Array implementation of lists, Stack and Queues as contiguous list

5.0 Linked lists (4 hours)

5.1 Definition
5.2 Link list as an ADT
5.3 Implementation
5.4 Operations in linked list: node insertion, deletion, insertion and deletion after and before nodes
5.5 Linked stacks and Queues: applications
5.6 Doubly linked lists and its applications

6.0 Recursion (4 hours)

6.1 Recursion and Principle of recursion
6.2 Need and importance of Recursion
6.3 Recursion and Iteration algorithm, converting recursion to iteration
6.4 TOH and Fibonacci sequence and Recursion
6.5 Applications of recursion, Search tree

7.0 Trees (6 hours)

7.1 Tree Concept
7.2 Basic operation in Tree: Insertion/deletions and search
7.3 Tree height, level, and depth
7.4 Binary tree traversals (pre-order, post-order and in-order)
7.5 AVL balanced trees, Balancing algorithm
7.6 Huffman tree and its application
7.7 B-Tree
7.8 Game tree

8.0 Sorting (6 hours)

8.1 Definition
8.2 Types of Sort: Internal and external sort
8.3 Insertion and selection sort, Exchange sort
8.4 Quick sort and Merge sort
8.5 Shell sort
8.6 Binary sort
8.7 Heap and heap sort as priority queue
8.8 Efficiency of sorting, Big 'O' notation

9.0 Searching (6 hours)

9.1 Definition of searching
9.2 Search technique
9.3 Essential of search,
9.4 Types of Search: Sequential search, Binary search, Tree search, General search tree
9.5 Hashing: Hash function and hash tables, Collision resolution technique
9.6 Efficiency comparisons of different search technique

10.0 Graphs (9 hours)

10.1 Definition of Graph
10.2 Representation and applications
10.3 Graphs as an ADT
10.4 Transitive closure
10.5 Graphs types, Graph traversal and Spanning forests
10.6 Warshall's algorithm
10.7 Kruskal's and Round-Robin algorithms
10.8 Shortest-path algorithm, Greedy algorithm, Dijkstra's Algorithm

Laboratory:

There shall be 10 lab exercises based on C or C++

1. Implementations of stack
2. Implementations of linear and circular queues
3. Implementation of TOH and Finbonacci Recursion
4. Implementations of linked list: singly and doubly linked
5. Implementation of trees: AVL trees, Balancing of AVL
6. Implementation of Merge and Quick sort
7. Implementation of search: Sequential, Tree and Binary
8. Implementation of Graphs: Graph traversals
9. Implementation of hashing
10. Implementations of Heap

References:

1. Y. Langsam, M.J. Augenstein and A. M. Tenenbaum, "*Data Structures using C and C++*", PHI
2. G. W. Rowe, "*Introduction to Data Structure and Algorithms with C and C++*", PHI
3. R.L. Kruse, B. P. Leung, C. L. Tondo, "*Data Structure and Program design in C*", PHI
4. G. Brassard and P. Bratley, "*Fundamentals of Algorithms*", PHI

VISUAL PROGRAMMING

BEG275CO

Year: II Semester: II

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	**150**

*** Continuous**

**** Duration: 3 hours**

Course objectives: To provide fundamental knowledge of Web programming.

1. Visual Programming Fundamentals **3**

- 1.1 Introduction to windows programming
- 1.2 Advantages and features of visual programming
- 1.3 Starting up the visual basic environment
- 1.4 Main components of VB programming environment (toolbox, form, code window, project window, property window)
- 1.5 Designing the basic appearance of the window
- 1.6 Concept of object properties and procedures
- 1.7 Introduction to Visual Basic toolbox

2. Dealing with errors and Bugs **1**

- 2.1 Understanding Errors
- 2.2 Working with the Error Object
- 2.3 Trapping Errors in program
- 2.4 Raising Errors from Program

3. Developing Coding scheme in visual basic **5**

- 3.1 Concept of variables and keywords
- 3.2 Data types, variables, scope of variables, constant and operators.
- 3.3 Converting between Data types, string functions, variant functions
- 3.4 Controlling of flow of the program: loops
- 3.5 Controlling of the flow of the program: conditionals
- 3.6 Working with Arrays, Records and Enumerators.
- 3.7 Manipulating objects built in VB
- 3.8 Working with function and procedure
- 3.9 Working with disk files and files handling technique with VB (***Binary and text file***).
- 3.10 Directory and files handling technique.
- 3.11 Use of message boxes and input boxes

4. Fundamental visual programming tools and controls 4

- 4.1 The command button control, label control.
- 4.2 The text box control, scroll bar control
- 4.4 The timer control.
- 4.5 File-system control (Drive ListBox, Direactory ListBOx and File ListBox)
- 4.6 Image box and picture box control
- 4.7 Advance graphics feature (Shape control, line control and some graphical methods)
- 4.8 List boxes and combo boxes
- 4.9 Option buttons and check boxes
- 4.10 Grouping of controls: frames and picture boxes

5. Advanced interface designing controls 18

- 5.1 Common Dialog Control
  - 5.1.1 File open dialog
  - 5.1.2 File save as dialog
  - 5.1.3 Color dialog
  - 5.1.4 Help dialog
- 5.2 Working with Control Arrays
- 5.3 Creating Menus for program
  - 5.3.1 Creating a Menu the Menu Editor
  - 5.3.2 Adding Shortcut and Access Keys to Menu Items
  - 5.3.3 Creating and accessing Pop-Up Menus
  - 5.3.4 Modifying Menus at run Time
- 5.4 Working with ActiveX Controls (Microsoft Windows Common Controls)
  - 5.4.1 Tree view control
  - 5.4.2 Toolbar control
  - 5.4.3 Status bar control
  - 5.4.4 Progress bar control
  - 5.4.5 Image list control
- 5.5 Interface
  - 5.5.1 Single Document Interface
  - 5.5.2 Multiple Document Interface
- 5.6 Creating an ActiveX controls with Visual Basic
  - 5.6.1 Learning the Basic of Control Creation
  - 5.6.2 Creating ActiveX Control
  - 5.6.3 Developing a Property Page
  - 5.6.4 Saving Developer Information for the Control
  - 5.6.5 Using the ActiveX Control Interface Wizard
  - 5.6.6 Testing an ActiveX Control
- 5.7 Windows API.
  - 5.7.1 Using API in Visual Programming
  - 5.7.2 API Viewer
- 5.8 Microsoft COM/DCOM Components
  - 5.8.1 Using COM and DCOM Components

5.8.2 Building COM Components

6. Database with Visual Programming **7**

6.1 An introduction with Data Base
6.2 Connecting to a database using the VB Data Form Wizard
6.3 Working with Microsoft **ActiveX Data Objects** (ADO) control
6.4 Displaying and editing records in a database
6.5 Introduction with **DataCombo** and **Datalist** control
6.6 Using Data grid control
6.7 Introduction with Structured Query Language and coding frequently used query statements.
6.8 Data Manipulation Language: **SELECT, INSERT, DELETE, UPDATE**
6.9 Using Data Environment Designer
6.9.1 Creating Connection in the Data Environment
6.9.2 Creating Command Objects
6.9.3 Binding the Data to Controls on a Form
6.9.4 Creating Child Command Objects
6.10 Using Report Generator
6.11 Using Chart Generator

7.0 Adding Help to Your Application **3**

7.1 Getting Help with F1
7.2 Displaying Help with the Common Dialog
7.3 Creating help Files and using it in Your Program

8.0 Deploying an application **4**

8.1 Creating setup Program
8.2 Creating a Disk-Based Installation Program
8.3 Creating a Network-Based Installation Program
8.4 Creating a Web_based Installation Program

Laboratory Exercises:

References:

1. "**Mastering Visual Basic 6 Fundamentals"**, Student Workbook, -Microsoft Corporation
2. "**Using Visual Basic 6"**, Siler & Spotts, Prentice-Hall of India

THEORY OF COMPUTATION

BEG274CO

Year: II **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**-**	20		80	-	100

* Continuous

** Duration: 3 hours

Course Objectives: course objective is to provide the knowledge of automata, and to apply the concept of context free language, and complexity theory.

1. **Finite automata and regular expression:** (7 hrs)
   - 1.1 Review of set theory
   - 1.2 Finite state system
   - 1.3 Non-deterministic finite automata
   - 1.4 Regular expressions

2. **Properties of regular sets:** (4 hrs)
   - 2.1 The pumping lemma for regular sets
   - 2.2 Closure properties of regular sets
   - 2.3 Decision algorithms for regular sets

3. **Context-free grammars:** (6 hrs)
   - 31. Derivative trees
   - 32. Simplification of context-free grammars
   - 33. Normal forms

4. **Pushdown automata:** (4 hrs)
   - 4.1 Introduction
   - 4.2 Pushdown automata and context-free grammars

5. **Properties of context-free languages (CFL)**: (6 hrs)
   - 5.1 The pumping lemma for CFL's
   - 5.2 Closure properties of CFL's
   - 5.3 Decision algorithms for CFL's

6. **Turing Machines:** (5 hrs)
   - 6.1 Computable languages and functions
   - 6.2 Church's hypothesis

7. **Undecidability:** (5 hrs)
   - 7.1 Properties of recursive and recursively languages
   - 7.2 Universal Turing machines and undecidable problem
   - 7.3 Recursive function theory

8. **Computational complexity theory:** (4 hrs)

9. **Intractable problems:** (4 hrs)
   - 9.1 Computable languages and functions
   - 9.2 NP-complete problems

References:

1. R. McNaughton, "*Elementary Computability, Formal Languages and Automata*", Prentice Hall of India
2. H.R. Lewis, and C. H. Papadimitriou, "*Element of the theory of Computation*", Eastern Economy Edition, Prentice Hall of India
3. E. Engeler, "*Introduction to the Theory of Computation*", Academic Press.

MICROPROCESSOR

BEG233EC

Year: II **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: The objective of this course is to provide fundamental knowledge to understand the operation, programming and application of microprocessor.

1. Introduction: (6 hours)

1.1 Evolution of microprocessor
1.2 Calculator and stored program computer
1.3 Von Neuman and Harvard architecture
1.4 Simple stored program computer architecture
1.5 Description of microprocessor architecture and applications

2. Microprocessor Instructions: (8 hours)

2.1 Register transfer language (RTL)
2.2 Instruction and machine cycle
2.3 Addressing modes: Direct, indirect, immediate, absolute, relative, indexed, register, stack and implied
2.4 RTL description of data transfer instructions, arithmetic instructions, logical instructions, branch instructions, and miscellaneous instructions
2.5 Fetch and execution cycle, fetch-execution overlap
2.6 Timing diagram for register move, indirect read, indirect write and out instruation

3. Assembly Language Programming: (10 hours)

3.1 Assembler instruction format: Opcodes, mnemonics and operands
3.2 Assembler operation: Sample assembly language program and code generation, one pass and two pass assembly
3.3 Macro assemblers, linking assemblers and assembler directives

4. Bus Structure and Memory Devices: (4 hours)

4.1 Bus structure, synchronous and asynchronous data bus, address bus, bus timing
4.2 Static and dynamic RAM, ROM

4.3 Programmable read only memory (PROM), ultraviolet electrically programmable memory (UVEPROM) and electrically erasable programmable memory (EEPROM)
4.4 SRAM and ROM interface requirements

5. Input/Output Interfaces: (7 hours)

5.1 Serial communication
5.1.1 Asynchronous interface: ASCII code, baud rate, start bit, stop bit, parity bit
5.1.2 Synchronous interface
5.1.3 Physical communication standard
5.1.4 8251A programmable communication interface
5.2 Parallel communication
5.3 Data transfer wait interface
5.4 RS-232 and IEEE 488-1978 general purpose interface standard
5.5 Keyboard and display controller

6. Interrupt: (4 hours)

6.1 Introduction, interrupt vector and descriptor table
6.2 Interrupt service routine requirements
6.3 Interrupt priority: Maskable and non-maskable interrupts, software interrupts, traps and exceptions
6.4 Vectored, chained and polled interrupt structures
6.5 Interrupts in parallel and serial interfaces

7. Multiprogramming: (4 hours)

7.1 Microprogramming, uniprogramming and multiprogramming
7.2 Process management and semaphore
7.3 Common procedure sharing
7.4 Memory management and virtual memory

8. Introduction to Advanced Microprocessor Architecture: (2 hours)

Laboratory

12 laboratory exercises using the microprocessor trainer kit and assembler.

References:

1. Ghosh, P. K., Sridhar P. R.,"*0000 to 8085: Introduction to Microprocessors for Engineers and Scientists*", Second Edition, Prentice Hall of India Private Limited, 1997.
2. " Lance, A. Leventhal., "*Introduction to Microprocessors: Software, Hardware, and Programming*", Eastern Economy Edition, Prentice Hall of India Private Limited, 1995.

3. Malvino, A. P., "*An Introduction to Microcomputers*", Prentice Hall of India Private Limited, 1995.

ELECTRONIC CIRCUIT I

BEG234EC

Year: II **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course objectives: To provide fundamental concept of various electronics circuits. The course focuses more on understanding of amplifiers, operational amplifier, Oscillator and power supplies.

1. **Low frequency transistor Amplifier circuits: (8 hours)**
   - 1.1. Review of low frequency AC and DC models,
   - 1.2. Amplifier configuration CB, CE, and CC: expressions for voltage gains and current gains, expressions for input and output impedances
   - 1.3. Single stage and multistage amplifiers: n-stage cascaded amplifiers, gain calculation, choice of configuration in a cascaded
   - 1.4. Darlington-pair amplifier
   - 1.5. Emitter follower amplifier

2. **Unturned amplifiers: (6 hours)**
   - 2.1. Classification of amplifiers
   - 2.2. Design of biasing circuits
   - 2.3. Frequency and phase responses
   - 2.4. RC coupled amplifiers: frequency response of RC-stages

3. **Large signal amplifiers: (6 hours)**
   - 3.1. Analysis of large signal model
   - 3.2. Push-pull amplifiers, transformer coupled push-pull stages
   - 3.3. Amplifier efficiency: power amplifiers, power dissipation and heat sinks

4. **Feedback amplifiers: (8 hours)**
   - 4.1. Negative feedback amplifiers
   - 4.2. Feedback configurations
   - 4.3. Feedback loop stability: bode plot analysis

5. Operational Amplifier Circuits: (6 hours)
   - 5.1. Input offset voltage
   - 5.2. Input bias and input offset currents
   - 5.3. Output impedance
   - 5.4. Differential and common-mode input impedances
   - 5.5. DC gain, bandwidth, gain-bandwidth product

5.6. Common-mode and power supply rejection ratios
5.7. Higher frequency poles, settling time
5.8. Slew rate

6. Oscillator Circuits: (6 hours)

6.1.Operation amplifier based relaxation oscillators
6.2.Voltage-to-frequency converters
6.3.Sinusoidal oscillators
6.4.Conditions for oscillators
6.5.Amplitude and frequency stabilization
6.6.Swept frequency oscillators
6.7.Frequency synthesizers
6.8.Function generators

7. Power Supplies and Voltage Regulators: (5 hours)

7.1.Half-wave and full-wave rectifiers
7.2.Capacitive filtering
7.3.Zener diodes, band gap voltage references, constant current diodes
7.4.Zener diode voltage regulators
7.5.Series transistor-Zener diode voltage regulators
7.6.Voltage regulators with feedback
7.7.IC voltage regulations

Laboratory:

There shall be laboratories exercises on designing of amplifiers, oscillators, and power supplies

Reference Books:

1.0 W. Stanely "operational Amplifiers with Linear Integrated circuits", Charles E. Merrill publishing company, Toronto,1984.

2.0 J. G. Graeme, "Application of operational Amplifiers: Third Generation Techniques" The burr-Brown Electronic series", McGraw-Hill, New York, 1973.

3.0 P. E. Allen and D. R. Holberg, "CMOS Analog Circuit Design", Holt, Rinehart and Winston, Inc., New York, 1987.

4.0 A. S. Sedra and K. C. Smith, "Microelectronic Circuits", 2nd Edition, Holt, Rinehart and Winston, Inc., New York,

ELECTRICAL MACHINE AND DRIVES

BEG224EL

Year: II **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: The course objective is to apply the principles of electric and magnetic circuits for electromechanical energy conversion. Able to understand the principles of rotating and non-rotating electrical machines.

1. Introduction: (3 hrs)

1.1 Magnetic circuits and Ampere's law
1.2 Ferromagnetic materials: magnetic saturation, non-linearity, hysteresis
1.3 Types of magnetic circuit
1.4 Effect of dc and ac, hysteresis and eddy currents, energy losses and laminations
1.5 Self and mutual inductances
1.6 Electromagnets

2. Transformers: (6 hrs)

1.1 Magnetically coupled circuits
1.2 Effects of secondary current in ideal transformer
1.3 Transformer reactances and equivalent circuits
1.4 Air core vs iron core transformers
1.5 Losses in transformer, open circuit and short circuit tests
1.6 Series and parallel connection of windings
2.7 Audio transformer, power transformers, auto transformers and instrumentation transformers
2.8 Three phase transformers

3. DC Machines: (4 hrs)

3.1 Construction of dc machine
3.2 Magnetic circuit, air-gap flux pattern and its effects
3.3 Torque production and voltage generation
3.4 Armature winding: lap and wave windings
1.5 Field excitation: shunt, series and compound fields
1.6 Armature reaction
1.7 Commutation, interpoles
1.8 Losses, cooling, rating and heating

4. DC Motors: (5 hrs)

4.1 Torque/speed characteristics of shunt, series and compound field motors
4.2 Armature reaction and motor operation
4.3 Commutation problems, pole face compensating windings
4.5 Speed regulation and control in dc motors
4.6 Effect of field excitation and armature voltage
4.7 Reverse rotation
4.8 Starting and speed control of motors, armature voltage and shunt field control

5. DC Generators: (4 hrs)

5.1 Voltage/speed/load characteristics
5.2 Shunt, series and compound field machines
5.3 Separate and self-excited machines, voltage build-up in self excited generators
5.4 Automatic voltage regulation

6. Synchronous and induction machines: (6 hrs)

6.1 Flux and MMF waves in synchronous machine
6.2 Salient pole and cylindrical rotor structures
6.3 Open-circuit and short-circuit characteristics
6.4 Generator voltage regulation with real and reactive power loads
6.5 Generator synchronization, load and power factor control, torque angle
6.6 Synchronous motor: equivalent circuit, starting, V-curves, variable power factor, torque angle, load limits

7. Fractional Horsepower (FHP) Drives: (6 hrs)

7.1 Single phase AC motors: split phase, capacitor start/run, shaded pole
7.2 Servo-type motors and their drivers
7.3 Stepper motors and electronic drivers
7.4 Permanent magnet DC and AC motors
7.5 AC synchro system for servo applications

8. DC Drives: (5 hrs)

8.1 Static variable DC voltage drives using diode and controlled rectifier
8.2 2-quadrant reversible voltage drives
8.3 2-quadrant reversible voltage and power flow drives

9. AC Drives: (6 hrs)

9.1 Scharge variable speed motor
9.2 Soft-start AC starter-controller for induction motors
9.3 Variable frequency supplies for AC drives: rotating synchronous and induction generators, pulse width modulated supplies and cycle- convertors

Laboratory:

1. Study of reversible DC motor drive system
2. Study of PWM controller for an AC machine

References:

1. E. Fitzgerald, C. Kinsley, and S. Dumans, "*Electric Machinery*" Tata McGraw-Hill India Limited, 1984.
3. M. G Say, "*A. C. Machines*",

ELECTROMAGNETICS AND PROPAGATION

BEG236EC

Year: II **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: The objectives of this course is to provide the knowledge to understand the fundamental laws of static and dynamic electric and magnetic fields, and apply electromagnetic fields and waves theory in the generation, transmission and measurement techniques.

1. Introduction: (3 hrs)

1.1 Scalars and vectors
1.2 Vector algebra
1.3 Coordinate system
1.4 Scalar and vector operations in different coordinate systems

2. Coulomb's Law and Electric Field Intensity: (3 hrs)

2.1 Coulomb's law
2.2 Electric field intensity
2.3 Field due to point charges and continuous charge distribution
2.4 Field of a line charge and sheet of charge

3. Electric Flux Density and Gauss's Law: (2 hrs)

3.1 Electric flux density
3.2 Gauss's law in integral form
3.3 Application of Gauss's law
3.4 Boundary condition at a conductor surface

4. Divergence: (2 hrs)

4.1 Concept of divergence
4.2 Maxwell's first equation and applications
4.3 Vector operator
4.4 Divergence theorem and applications

5. Energy and Potential: (3 hrs)

5.1 Electric energy
5.2 Potential and Potential difference
5.3 Potential field of a point charge and system of charges
5.4 Potential gradient
5.5 Electrical intensity as the negative gradient of a scalar potential

5.6 Conservative fields
5.7 Electric energy density

6. Electrostatic Field in Material Media: (2 hrs)
6.1 Polarization
6.2 Free and bound charge densities
6.3 Relative permittivity
6.4 Capacitance calculations

7. Boundary Value Problems in Electrostatics: (5 hrs)
7.1 Laplace's and Poisson's equations
7.2 Uniqueness theorem
7.3 One-dimensional and two-dimensional boundary value problems
7.4 Relaxation methods and numerical integration
7.5 Graphical field plotting
7.6 Capacitance calculations

8. Current and current density: (2 hrs)
8.1 Conservation of charge
8.2 Continuity of current
8.3 Point form of Ohm's law
8.4 Relaxation time constant

9. Magnetostatics: (3 hrs)
9.1 Biot-Savart's law
9.2 Magnetic intensity and magnetic induction
9.3 Ampere's circuital law
9.4 Applications

10. Curl: (3 hrs)
10.1 Introduction
10.2 Stoke's theorem
10.3 Magnetic flux and magnetic flux density
10.4 Ampere's law in point form
10.5 Scalar and vector magnetic potentials
10.6 Derivation of steady magnetic field laws
10.7 Boundary value problems

11. Magnetic force and material: (1 hrs)
11.1 Magnetic force
11.2 Magnetization and permeability
11.3 Magnetic boundary condition
14.4 Magnetic circuits

12. Time–Varying fields and Maxwell's Equations (3 hrs)
12.1 Faraday's law

12.2 Inadequacy of Ampere's law with direct current
12.3 Conflict with continuity equation
12.4 Displacement current
12.5 Maxwell's equation in point form, Maxwell's equation in integral form
12.6 Retarded potential

13. Wave Equations (7 hrs)

13.1 Wave motion in free space, perfect dielectric, and lossy medium
13.2 Wave impedance, Skin effect, A.C. resistance
13.3 Poynting vector
13.4 Reflection and refraction of uniform plane wave
13.5 Reflection and transmission coefficient
13.6 Standing wave ratio
13.7 Impedance matching
13.8 Wave guides

14. Wave Propagation (5 hrs)

14.1 Relationship between a current element and an electric dipole
14.2 Power radiated by a current element
14.3 Input impedance of short and longer antennas
14.4 Electromagnetic field close to an antenna: Quadrature and inphase terms
14.5 Antenna theorems, Types of antennas

15. Introduction to Microwaves (1 hr)

Laboratory

Six laboratory exercises to demonstrate the concept of electromagnetics and using simulation software.

References:

1. W. H. Hayt, "*Engineering Electromagnetic*", Tata McGraw-Hill Book Company, New Delhi.
2. J. D. Kraus and K. R. Carver, "*Electromagnetics*"

APPLIED SOCIOLOGY

BEG395MS

Year: II **Semester: II**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration Hours	Marks	Duration	Marks				
3	--	1	3	80	--	--	20	--	100	

1. Introduction : (4 Hours)

1.1 Definition of sociology
1.2 Evolution of Sociology
1.3 Relationship of Sociology with other social sciences
1.4 Application of Sociology in addressing contemporary issues.

2. Language of Sociology: (14 Hours)

2.1 Society and culture
2.2 Tribe, Caste & Ethnicity
2.3 Community and Institutions
2.4 Homogenous & Heterogeneous
2.5 Norms and Values
2.6 Co-operation & Conflict.
2.7 Status & roles
2.8 Competition & Conflict.
2.9 Association and group

3. Fundamental concepts in sociology: (14 Hours)

3.1 Social system
3.2 Social structure: family , caste and ethnic group, religions festivals
3.3 Social process
3.4 Socialization
3.5 Social and Cultural change
3.6 Social stratification
3.7 Social problem and social control.

4. Nepalese Culture and Society: (12 Hours)

5.1 Historical ideological and political dimension of Nepalese culture and society.
5.2 Caste system in Nepal
5.3 Ethnic groups and interrelationship among them.

5.4 Religions and festivals in Nepal
5.5 Social stratification in Nepalese Societies on the basis of Caste, gender, Ethnicity and Age

5. Community Development (16 Hours)

5.1 Meaning
5.2 Nature and History
5.3 Development Approaches
5.4 Community organizing for people's empowerment.
5.5 Communications and community Education
5.6 Community mobilization
5.7 Indigenous and appropriate Technology
5.8 Ecology and Environment
5.9 Community participation in development activities.
5.10 Gender differences and role of Women in energy conservation & development, social cycle, Modernization and Globalization
5.11 Application of knowledge of sociology with special reference energy, policy, legal issues and practices, identification of issues & resolution

Recommended Books:

1. Inkels Alex, "What is Sociology? Introduction in the discipline and profession, Prentice Hall of India"
2. Foster G. M. :"Traditional Culture and impact of Technological Change"
3. Mair L. :" Applied Sociology, Anthropology"
4. Gsanlender A. W. :"Applied Sociology opportunity and Problems"
5. Regmi Rishikeshav Raj "Dimenshion of Nepali society and culture"
6. Gurung Sant Bahadur: "Rural Development Approach in Nepal" Deva Publications Kathmandu

BE Third Year Detail Syllabus

3rd Year 1st Semester

&

3rd Year 2nd Semester

SYSTEM ANALYSIS AND DESIGN

BEG371CO

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**-**	20	-	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide basics of system analysis and design .

1. Overview of Systems analysis and design (4 Hours)

1.1 Introduction to system analysis and design
1.2 Types of Information Systems and Systems Development
1.3 Developing Information Systems and the Systems Development Life cycle
1.4 Systems analysis and design tools

2. Structuring System Requirements: Process Modeling (4 Hours)

2.1 Process Modeling
2.2 Data Flow Diagramming Mechanics
2.3 Four Different Types of DFDs
2.4 Using Data Flow Diagramming in the Analysis Process

3. Structuring System Requirements: Logic Modeling (4 Hours)

3.1 Logic Modeling
3.2 Modeling Logic with Structured English
3.3 Modeling Logic with Decision Tables
3.4 Modeling Logic with Decision Trees
3.5 Deciding among Structured English, Decision Tables, and decision Trees

4. Structure System Requirements: Conceptual Data Modeling (4 Hours)

4.1 Conceptual Data Modeling
4.2 Gathering Information for Conceptual Data Modeling
4.3 Introduction to E-R Modeling
4.4 Conceptual Data Modeling and the E-R Model
4.5 The Role of CASE in Conceptual Data Modeling

5. Object-Oriented Analysis and Design (6 Hours)

5.1 Object-Oriented Development Life Cycle
5.2 The Unified Modeling Language
5.3 Use-Case Modeling
5.4 Object Modeling: Class Diagrams
5.5 Dynamic Modeling: State Diagrams

5.6 Dynamic Modeling: Sequence Diagramming
5.7 Analysis Verses Design

6. Designing Databases: Logical Data Modeling (4 Hours)
6.1 Logical Data Modeling
6.2 Relational database Model
6.3 Concept of Normalization
6.4 Transforming E-R Diagrams into Relations
6.5 Merging Relations

7. Designing Physical Files and Databases (4 Hours)
7.1 Physical File and Database Design
7.2 Designing Fields
7.3 Designing Physical Records
7.4 Designing Physical Files
7.5 Designing Databases
7.6 CASE in Database Design

8. Designing the Internals: Program and Process Design (6 Hours)
8.1 Designing the Internals
8.2 Structure Charts
8.3 Transaction- Centered and Transform-Central Designs
8.4 Transform Analysis
8.5 Guidelines of Good Design
8.6 Five Types of Coupling
8.7 Seven Types of Cohesion
8.8 Specifying the Contents of Modules
8.9 Case Tools in designing Programs

9. Designing Distributed Systems (4 Hours)
9.1 Designing Distributed Systems
9.2 Designing Systems for LAN
9.3 Designing Systems for a Client/ Server Architecture
9.4 Managing Data in Distributed Systems
9.5 Alternative Designs for Distributed systems

10. Implementation and Maintenance (5 Hours)
10.1 System Implementation
10.2 Software Application testing
10.3 Installation
10.4 Documenting the System
10.5 Training and Supporting Users
10.6 Organization Issues in Systems Implementation
10.7 Project Close-Down
10.8 Maintaining Information Systems
10.9 Conducting Systems Maintenance

References:

1. Jeffrey A. Hoffer, Joey F. George , Joseph S. Valacich, "Modern Systems Analysis and Design", Pearson Education, Second Edition
2. Englewood Cliffs, New Jersey, 2nd edition, " Systems Analysis and Design" Whitten, Jeffrey L., 3rd edition, "Systems Analysis and Design methods"
2. Baase, Pearson Education, "Computer Algorithms: Introduction to Design and Analysis"

NUMERICAL METHODS

BEG370CO

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objective: To solve the engineering problems by using the theory of numerical computational procedures.

1. Introduction **(2 hours)**

1.1. Introduction to Numerical Method
1.2. Needs of Numerical Method
1.3. Number and their accuracy
1.4. Errors (Absolute, Relative, rounding off error, truncation error, general error formula)
1.5. Convergence

2. System of non-linear equations **(8 hours)**

2.1. Introduction
2.2. Graphical Method
2.3. The iteration methods
2.4. The bisection method
2.5. Newton Raphson Method
2.6. Secand Method
2.7. Fixed point iteration
2.8. Zeros of polynomials by horner's method

3. Interpolation **(10 hours)**

3.1. Introduction
3.2. Polynomial forms
3.3. Linear interpolation
3.4. Lagrange Interpolation polynomial
3.5. Spline Interpolation
3.6. Chebyshev Interpolation Polynomial
3.7. Least squares method of fitting continuous and discrete data or function

4 Numerical differentiation and integration **(5 hours)**

4.2 Introduction
4.3 Numerical differentiation
4.4 Numerical integration
4.5 Numerical double integration

5 Matrices and linear systems of equations (10 hours)

5.2 Introduction
5.3 Review of the properties of matrices
5.4 Solution of linear systems-direct methods
5.5 Solution of linear systems-iterative methods
5.6 The eigenvalue problem
5.7 Singular Value decomposition

6 **Numerical Solution of ordinary differential equations (7 hours)**

6.1 Introduction
6.2 Euler's method for solving ordinary differential equation of first order
6.3 Runga-Kutta methods
6.4 Predictor- Corrector methods
6.5 Simultaneous and higher order equations
6.6 Initial value problems
6.7 Boundary value problems

7 Numerical Solution of partial differential equations (3 hours)

7.1 Introduction
7.2 Finite-difference approximations to derivates
7.3 Laplace's Equation
7.4 Parabolic Equations
7.5 Iterative methods for the solution of equations
7.6 Hyperbolic equation

Laboratory:

There shall be 12 laboratory exercises using high level programming language

References:

1. Computer Oriented Numerical Methods, V. Rajaraman
2. Introductory methods of Numerical analysis, S.S. Sastry
3. An Introduction to numerical computations, S. Yakowitz and F. Szidarovszky

INSTRUMENTATION I

BEG330EC

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide fundamental knowledge of instrumentation and measurements.

1. **Introduction:** **(4 hours)**
   - 1.1. Instrumentation and Components of instrumentation
   - 1.2. Transducting, Signal Conditioning and Signal Transmission
   - 1.3. Input and Output device
   - 1.4. Type of signals

2. **Measurements:** **(12 hours)**
   - 2.1. Units and standards of measurements
   - 2.2. Measuring instruments: Performance parameters, Dynamic parameter
   - 2.3. Resistance measurement with Whetstone bridge
   - 2.4. Inductance and capacitance bridges
   - 2.5. Error in measurement and error type

3. **Variables and Transducers:** **(10hours)**
   - 3.1. Physical variables and their types (Electrical, Mechanical, Process, Bio-physical variable)
   - 3.2. Types, principle of operation, input and output characteristics and applications of transducers (resistive, capacitative, inductive, voltage and currents)
   - 3.3. Calibrations and error in transducers

4. **Signal Conditioning and Processing:** **(10 hours)**
   - 4.1. Importance of signal conditioning and processing
   - 4.2. Signal amplification and Filtering
   - 4.3. Instrumentation amplifier: Op-Amp in instrumentation
   - 4.4. Interference signals and their elimination: shielding and grounding
   - 4.5. Signal conversion (Analog-to-Digital, Digital-to-Analog)

5. **Signal Transmission:** **(7hours)**
   - 5.1. Transmission media and their Types

5.2. Transmission schemes: Analog and Digital
5.3. Data transmission system and standards

6. Output Device: (3hours)

6.1. Feature of Output device
6.2. Indication instruments
6.3. Data recording system, strip-chart, X-Y display and Plotter

Laboratory:

1. Measurement of physical variables using various bridges.
2. Conversion of physical variables into electrical signal.
3. Signal conditioning (amplification and filtering).
4. Error measurements in instrumentation system.
5. Observation of interference in instrumentation and their remedy.
6. Conversion of analog signal into digital and digital into analog signal.

References:

1. A.D. Helfrick and W.D. Cooper, *"Modern Electronic Instrumentation and Measurement Techniques*", Prentice Hall of India 1996.
2. S. Wolf and R.F.M. Smith, *"Student Reference Manual for Electronic Instrumentation Laboratories*", Prentice-Hall of India 1996
3. A. K. Sawhney, "*A Course in Electronic Measurements and Instrum*entation", Dhanapat Rai and Sons, India, 1998
4. C.S. Rangan, G.R.Sarma, and V.S.V. Main, "*Instrumentation: Devices and Systems*", Tata McGraw Hill, India, 1992
5. D.M.Considine, "*Process Instruments and Controls Handbooks*", McGraw Hill 1985.

COMPUTER ORGANIZATION AND DESIGN

BEG372CO

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**-**	20	-	80	-	100

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide basic architectural and designing concepts of computers. This course gives the behaviour and structure of different building blocks of computer system..

1. Evolution of computer systems (3 hours)

1.1. The discipline of computer science and engineering

1.2. Manual verses Machine Computation

1.3. Mechanical Calculator

1.4. Electromechanical Machines

1.5. Evolution of electronic Computer Systems

1.6. Different Layers of Computer Systems and their Interfaces

1.7. Complexity of Computing

2. Computer System Design (4 hours)

2.1. Design of a Computer System

2.2. RTL structure Realizing behaviour expressed in an algorithms

2.3. Logic Circuit level structure of RTL components

2.4. Interfacing devices of different Logic families

2.5. Gate array

2.6. MOS transistor switch level network

2.7. Computer Aided Design (CAD) tools

3. Information Representation (3 hours)

3.1. Built-in Data Types

3.2. Complex data types and data structures

3.3. Error detection and correction

3.4. Semantic Gap

3.5. Self-defining data type

4. Central processing unit (CPU) (6 hours)

4.1. Data path and control path to support different operations on built-in data types

4.2. Micro operations on data path and the associated control signals

4.3. Machine language instructions

4.4. Execution of instructions

4.5. Arithmetic and logic unit (ALU)

4.6. Arithmetic Processor

4.7. Interrupt Cycle

5. Control design (6 hours)

5.1. Control transfer
5.2. Fetch cycle
5.3. Instruction interpretation and execution
5.4. Hardwired Control
5.5. Microprogrammed control

6. Memory system (6 hours)

6.1. CPU- memory interaction
6.2. Storage technology
6.3. Memory array organization and Technology
6.4. Semiconductor memory
6.5. Solution for the speed mismatch between Main storage and CPU
6.6. Multiple Module memory
6.7. Associative memory
6.8. Virtual memory
6.9. Gap filler memories

7. Secondary Storage (5 hours)

7.1. Magnetic medium and magnetic head
7.2. Digital recording methods
7.3. Magnetic tape drive and controller
7.4. Low cost tape drives
7.5. Disk drive and controller
7.6. Cyclic redundancy check logic

8. Input- output devices and processing (6 hours)

8.1. Printers
8.2. Video Display Unit (VDU)
8.3. Computer Graphics
8.4. Plotters
8.5. Data transfer techniques
8.6. Bus interface
8.7. IO accessing and data transfer
8.8. IO interrupt
8.9. IO channel/ processor

9. Computer system architecture (6 hours)

9.1. Performance and cost
9.2. Instruction set architecture (ISA)
9.3. Micro-architecture
9.4. Architecture of memory subsystem
9.5. IO subsystem architecture
9.6. Parallel processing system architecture

Laboratory Exercises:

The laboratory exercises shall be hands-on Computer architecture project aiming to familiarize students with processor, Control Unit, memory and input and output devices.

References:

1.A. Tanenbaum, " Structured computer Organization" , 3rd edition, prentice hall, 1990
2.William Stallings , " Computer Organization and architecture", PHI
3. M. Mano, " Computer System Architecture"
4. M. Morries Mano, Charles R. Kime, " Logic and computer design fundamentals", PHI
5. Tom shanley, " plug and play system architecture", Addison Wesley publishing company

OPERATING SYSTEM

BEG373CO

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide the concepts of Operating systems Design and Implementation

1. Operating System Overview **3**

- 1.1 OS objectives and functions
  - 1.1.1 OS as a user/computer interface
  - 1.1.2 OS as Resource Manager
- 1.2 Evolution of Operating Systems
  - 1.2.1 Serial Processing
  - 1.2.2 Simple Batch Systems
  - 1.2.3 Multi-programmed Batch Systems
  - 1.2.4 Time-Sharing Systems

2. Process **21**

- 2.1 Introduction to Process
  - 2.1.1 The Process Model
  - 2.1.2 Implementation of Processes
  - 2.1.3 Threads
- 2.2 Inter Process Communication (IPC)
  - 2.2.1 Race Conditions
  - 2.2.2 Critical Sections
  - 2.2.3 **Join and Fork Statement**
  - 2.2.4 Mutual Exclusion with Busy Waiting
  - 2.2.5 Sleep and Wakeup
  - 2.2.6 Semaphores
  - 2.2.7 Monitors
  - 2.2.8 Message Passing
- 2.3 Classical IPC problems
- 2.4 Process Scheduling
  - 2.4.1 Round Robin Scheduling
  - 2.4.2 Priority Scheduling
  - 2.4.3 Multiple Queues
  - 2.4.4 Shortest Job First
  - *2.4.5 Guaranteed Scheduling*
  - *2.4.6 Lottery Scheduling*
  - 2.4.7 Real-Time Scheduling

2.4.8 Two-Level Scheduling
2.4.9 Policy versus mechanism

3. Input/Output **3**
- 3.1 Principles of I/O Hardware
- 3.2 Principles of I/O Software
- 3.3 Disks
- 3.4 Clocks
- *3.5 Terminals*

4. Deadlocks **4**
- 4.1 Resources of Deadlock
- 4.2 Principles of Deadlock
- 4.3 Deadlock Detection and algorithm
- 4.4 Deadlock Avoidance

5. Memory Management **5**
- 5.1 Fixed and Variable partition systems
- 5.2 Bit maps
- 5.3 Memory Management with Linked list
  - 5.3.1 First-fit, best-fit, next-fit, quick-fit and buddy-system
- 5.4 Multiprogramming memory management techniques
- 5.5 Virtual Memory
  - 5.5.1 Paging Segmentation
  - 5.5.2 Swapping and Page Replacement

6. File Systems **3**
- 6.1 Files and Directories
- 6.2 File System Implementation
- 6.3 File Sharing and Locking

7. **Case Studies:** Aspect of UNIX and Windows NT 6

Laboratory:

There shall be laboratories exercises covering all aspects of above chapters

References:

1. Operating Systems: Design and Implementation
   -Tanenbaum A.S., woodhull A.S. (Prentice-Hall)
2. Operating System: Internals and Design Principles
   -Stallings, William (Prentice-Hall)
3. Operating System Concepts
   -Sibberschatz A.,Galvin P.B. (Addison-Wesley)
4. Mark Donovan: System Programming

CONTROL SYSTEMS

BEG320EL

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course objectives: To provide knowledge on feedback control Principles and to apply these concepts to control processes.

1. System Modeling: (7 hours)

1.1. Differential equation and transfer function
1.2. State-space formulation of differential equations, matrix notation
1.3. Mechanical components and Electrical components: mass, spring, damper, Inductance, capacitance, resistance, sources, motors, tachometers, transducers, operational amplifier circuits
1.4. Fluid and fluidic components, Thermal system components
1.5. Mixed systems
1.6. Linearized approximations

2. Transfer Functions and Responses: (8 hours)

2.1. Components to physical systems
2.2. Block diagram and system reduction
2.3. Mason's loop rules
2.4. Laplace transform analysis of systems with standard input functions - steps, ramps, impulses, sinusoids
2.5. System state: initial and final steady-state
2.6. Effects of feedback on steady-state gain, bandwidth, error magnitude, dynamic responses

3. Stability: (4 hours)

3.1 Heuristic interpretation for stability of a feedback system
3.2 Characteristic equation, complex plane interpretation of stability, root locations and stability
3.3 Routh-Hurwitz criterion, eigenvalue criterion
3.4 Setting loop gain using the R-H criterion
3.5 Relative stability from complex plane axis shifting

4. Root Locus Method: (6 hours)

4.1 Relationship between root loci and time responses of systems
4.2 Rules for construction of root loci diagrams
4.3 Computer programs for root loci plotting, polynomial root finding

4.4 Derivative feedback compensation design with root locus
4.6 Setting controller parameters using root locus, Parameter change sensitivity analysis by root locus

5. Frequency Response Methods: (4 hours)

5.1 Frequency domain characterization of systems
5.3 Bode amplitude and phase plots, Effects of gain time constants on Bode diagrams, Stability from the Bode diagram
5.3 Nyquist plots, Correlation between Nyquist diagrams and real time response of systems: stability, relative stability, gain and phase margin, damping ratio

6. Computer Simulation of Control System: (4 hours)

6.1 Role of simulation studies
6.2 Linear and non-linear simulations

7. Performance Specifications for Control Systems: (2 hours)

7.1 Time domain specifications: steady-state errors, response rates, error criteria, hard and soft limits on responses, damping ratio, log decrement
7.2 Frequency domain specifications: bandwidth, response amplitude ratio

8. Compensation and Design: (8 hours)

8.1 Root locus, frequency response and simulation in design
8.3 Feedback compensation
2.5 Lead, lag, and lead-lag compensation, PID controllers

9. Digital Control System (2 hours)

9.1 Introduction of Digital Control System
9.2 Components of Digital Control System
9.3 Designing criteria of Digital Control system

Laboratory:

1.0 Identification of Control System Components
2.0 Open and Closed Loop Performance of Servo Position Control System
4.0 Simulation Study of Feedback System Using TUTSIM or MATLAB
5.0 Design of a PID Controller
6.0 Non-Electrical Control System

Reference Books:

1.0 K. Ogata, “Modern Control Engineering”, 2nd Edition, Prentice Hall, Englewood Cliffs, New Jersey, 1990.

COMMUNICATION SYSTEMS

BEG331EC

Year: III **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To familiarize students of Computer Engineering with basic principles of analog and digital communications.

1. Signals and Systems: 2

1.1 Definition, types and properties of signals used in communication systems

1.2 Definition, models and properties of the communication systems

1.3 Fourier series and Fourier transforms

2. Propagation and Antenna: 3

2.1 Propagation peculiarities of EMW in various medium

2.2 Antenna fundamentals: Principles, types, patterns, parameters and uses

3. Continuous Wave Linear Modulation: 5

3.1 Need for modulation

3.2 Time domain expression, spectral representation, power, transmission bandwidth of DSB-AM, DSB-SC, SSB and VSB

3.3 Generation methods of DSB-AM, DSB-SC, SSB and VSB

3.4 Demodulation of AM signals: Square law, envelop, synchronous detectors.

3.5 Introduction to Phase Locked Loop (PLL).

3.6 PLL as a universal detector of AM signals.

3.7 The Superheterodyne receiver for standard AM radio

4. Non-Linear Modulation: 4

4.1 Definition, time domain representation and transmission bandwidth of single tone modulated FM and PM

4.2 Transmission bandwidth for FM, Carlson's rule, narrow-band and wide-band FM

4.3 Generation methods of FM and PM

4.4 Demodulation of FM and PM: Limiter-discriminator method and PLL

4.5 Introduction to Stereo FM transmission and reception.

5. Spectral Analysis: 2

5.1 Review of Energy and Power, Parseval's Theorem

5.2 Power Spectral Density Function (psdf), psdf of harmonic signal, auto-correlation function, relationship between psdf and auto-correlation function

6. Frequency Division Multiplexing (FDM) System: 2

6.1 FDM in telephony, telephone hierarchy

6.2 Filter and oscillator requirements in FDM

7. Noise in communication systems: 3

7.1 White noise, thermal noise and other noise encountered in communication systems, distortion and interference

7.2 Psdf of white noise. Input and output relationships for random signals and noise passed through a LTI system

7.3 Band limited white noise, RC filtering of white noise

7.4 Noise equivalent bandwidth

8. Noise performance of Analog Communication Systems: 2

8.1 Signal to noise ratio (SNR) and system gain in AM, SSB and FM

8.2 Threshold effects in AM and FM

9. Digital Communication Systems (DCS): 4

9.1 Digital signal sources, transmitters, transmission channels, encoders and receivers

9.2 Nyquist sampling theorem, sampling of band limited analog signals, spectrum of sampled signals, reconstruction of original analog signal

9.3 Sampling theorem for band-pass signals, aliasing effects

10 Pulse Modulation Systems: 5

10.1 Pulse Amplitude Modulation (PAM), bandwidth requirements and reconstruction methods, Time division multiplexing (TDM)

10.2 Analog-to-digital (A/D) conversion, quantization and encoding techniques, Pulse Code Modulation (PCM)

10.3 Quantization noise in PCM, companding in PCM systems

10.4 The T1 and E1 hierarchy in digital telephony

10.5 Introduction to Delta Modulation (DM)

10.6 Introduction to linear prediction theory

11. Baseband Digital Communication: 3

11.1 Introduction to information theory, definition of information and entropy

11.2 Shannon's channel capacity theorem and the information rate

11.3 Base-band digital communication systems, pulse shaping and bandwidth consideration, Inter-symbol interference (ISI)

11.4 Nyquist pulse shaping criteria for zero ISI, examples of practical pulse shaping techniques

12. Modulated Digital Data Communication Systems: 3

12.1 ASK, FSK, PSK and DPSK
12.2 M-array data communication systems
12.3 Application of Modems

13. Noise Performance of DCS: 4

13.1 The matched filter
13.2 Performance limitation of base band digital communication due to noise and ISI, bit error probability (BEP) and bit error rate (BER)
13.3 Coding for error detection and correction, examples of practical coding techniques

14. Introduction to various communication systems: 3

14.1 AM and FM broadcasting
14.2 Terrestrial and satellite TV broadcasting
14.3 Terrestrial microwave links
14.4 Optical fiber links
14.5 Cellular mobile communication
14.6 Wireless in Local loop
14.7 Global mobile personal communication systems via satellite (GMPCS)

Laboratory exercises:

Five experiments related to basic principles of communication systems as decided by the course instructor

References:

1. S. Haykin, " An introduction to Analog and Digital Communication " (Latest edition)
2. Leon W. Couch II, "Digital and Analog Communication Systems", Sixth Edition, Pearson Education Asia, 2001.
3. B.P. Lathi, "Modern Digital and Analog Communication Systems", Third Edition, Oxford University Press, 1999.
4. J. Proakis, M. Salehi, " Communication Systems Engineering", Prentice Hall, New Jersey, 1994.

RESEARCH METHODOLOGY

BEG396MS

Year: III **Semester: II**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration	Marks	Duration	Marks				
2	--	1	1.5	40	--	--	10	--	50	

1. Social Research - 3 Hours

1.1 Definition
1.2 Objectives
1.3 Phases on Social Research
1.4 Types of Social Research : Basic & Applied Research

2. Fundamental Concept on Research - 5 Hours

2.1 Hypothesis
2.2 Sampling, its characteristics, types, benefits and problems
2.3 Field work
2.4 Validity
2.5 Reliability

3. Research Design - 5 Hours

3.1 Definition of Research Design
3.2 Types of research Design
3.3 Research Proposal
3.4 Selection of topics of Research

4. Data Collection - 4 Hours

4.1 Meaning of Data Collection
4.2 Importance of Data Collection
4.3 Types of Data
4.4 Source of Data Collection

5. Data Collection Techniques and Classification - 5 Hours

5.1 Survey
5.2 Interview
5.3 Questionnaire
5.4 Case Study
5.5 Observation

5.6 Analysis and Presentation of data

6. Mean, Median and Standard Deviation -5 Hours

6.1 Definition
6.2 Different methods of calculation of mean, median and standard Deviation

7. Report Writing - 3 Hours

7.1 Definition
7.2 Organization of Report
7.3 Presentation of Diagram
7.4 Construction of tables
7.5 Bibliography

References:

2. Best, John W. : "Research in Education, Prentice hall of India, New Delhi
3. Wolf Howard K. and Prem R. Panta: "Social Science Research and Thesis Writing" Research Division TU, Kirtipur, 1975
4. Goode William J. and Paul K. Hatt: "Methods in Social Research" Megraw Hill Kogakusha Ltd., 1952
5. Tika Bhattarai: "Research Methodology"

PROBABILITY AND STATISTICS

BEG203HS

Year: III **Semester: II**

Teaching Schedule Hours/ Week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration Hours	Marks	Duration	Marks				
3	--	1	3	80	--	--	20	--	100	

1 Introduction and Descriptive Statistics: 4 hours

1.1 An overview of probability and statistics
1.2 Pictorial and tabular methods in descriptive statistics
1.3 Measures of location: mean, median, quartiles, percentiles, etc.
1.4 Measures of variability

2 Probability: 4 hours

2.1 Sample spaces and events
2.2 Axioms, interpretations and properties of probability
2.3 Counting techniques
2.4 Conditional probability

3 Discrete Random Variables and Probability Distributions: 6 hours

3.1 Random variables
3.2 Probability distributions for random variables
3.3 Expected values of discrete random variables
3.4 The binomial probability distribution
3.5 Hypothesis testing using the binomial distribution
3.6 The hypergeometric and negative binomial distributions
3.7 The poisson probability distributions

4 Continuous Random Variables and Probability Distributions: 6 hours

4.1 Continuous random variables and probability density functions
4.2 Cumulative distribution functions and expected values for continuous random variables
4.3 The normal distribution
4.4 The Gamma Distribution
4.1 Chi-Square Distribution

5 Joint probability Distributions and Random Samples: 4 hours

5.1 Jointly distributed random variables
5.2 Expected values, covariance and correlation

5.3 Sums and averages of random variables
5.4 The Central limit theorem

6 Point Estimation: 2 hours

6.1 Some general Concepts of point estimation
6.2 Methods of point estimation

7 Hypothesis testing procedures based on a Single Sample: 5 hours

7.1 Tests about the mean of a normal population
7.2 Large-sample tests for a population mean
7.3 Large-sample tests for population proportions
7.4 The t-test
7.5 Test procedures for a population variance
7.6 Some comments on selecting a test procedure

8 Hypothesis Testing Based on Two Samples: 4 hours

8.1 Z-tests for differences between two population means
8.2 The two-sample t-test
8.3 Analysis of paired data
8.4 Testing for differences between population proportions

9 Interval Estimation: 3 hours

9.1 A confidence interval for the mean of a normal population
9.2 Large-sample intervals for population means
9.3 confidence intervals for population proportions
9.4 Small-sample intervals for means of normal populations

10 Simple Linear Regression and Correlation: 4 hours

10.1 The simple linear probabilistic model and the principle of least squares
10.2 inferences about the slope parameter beta 1
10.3 inferences concerning um sub x, y and the prediction of future values
10.4 Correlation and the coefficient of determination

11 The analysis of categorical data 3 Hours

11.1Goodness of Fit tests when probabilities are completely specified
11.2Goodness of fit for composite Hypothesis
11.3Two way contengency Tables

References:

1. Jay L. Devore, “probability and Statistics for Engineering and the Sciences”, Brooks/Cole publishing Company, Monterey, California, 1982.

COMPUTER NETWORK

BEG374CO

Year: III **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	-	**3**	20	50	80	-	150

*** Continuous**
**** Duration:** 3 hours

Course Objective:

1.0 Introduction to Computer Networks 4

1.1 Definition, Advantages, Disadvantages, Applications
1.2 Network structure and topologies
1.3 Network architecture and OSI model
1.4 Connection oriented and connectionless services
1.5 Network examples: Public network, ARPNET, USENET,CSNET,BITNET,SNA

2.0 Local Area Networks 4

2.1 LAN primer: Network server, Netwok workstation
2.2 Network hardware: NIC, Cables, Hub, Storage, Backup,RAID,UPS, Printer
2.3 LAN scheme: CSMA/CD and IEEE 802.3

3.0 Transmission and Channel Control: The Physical Layer 5

3.1 Transmission media; Twisted pair, Coaxial, Fiber optic, Line-of-site, Satellite
3.2 Analog transmission: Telephone, Modem, RS 232 and RS 449
3.3 Digital transmission: PCM, Encoding, X.21
3.4 Channel allocation and switching: Multplexing, Circuit switching,Packet switching
3.5 Telecommunication switching system (Networking of Telphone exchanges)
3.6 ISDN: Architecture, Interface, Signaling

4.0 Channel Access Protocols: The Data Link Layer and Medium Access Sub-layer: 5

4.1 Channel access: Polling, Non-polling, peer to peer non priority, Peer to peer priority
4.2 IEEE standard 802 for LANs: 802.3, 802.4, 802.5
4.3 Fiber optic networks: FDDI, Fiber Net II, S/Net, Datakit,Fastnet and Expressnet
4.4 Satellite Networks: SPADE,ALOHA

5.0 The X.25 Netwoks **4**

- 5.1 X.25 and the physical layer
- 5.2 X.25 and the data link layer
- 5.3 X.25 Features: PVC, Virtual circuit, Datagram, Fast select
- 5.4 Packet Formats

6.0 Internetworking **4**

- 6.1 Routing algorithms
- 6.2 Congestion control algorithms
- 6.3 Bridges, Routers and Gateways
- 6.4 X.75, Frame relay

7.0 Network Trouble-Shooting **3**

- 7.1 Continuity Test
- 7.2 Resistance and Termination Tests
- 7.3 LAN Test Instruments:

7.3.1 Multimeter,Timer Domain Reflectometer(TDR),visual inspection, software diagnostics

8.0 Peer to Peer **2**

- 8.1 Wokgroups
- 8.2 Sharing Resources
- 8.3 Accessing Resources

9.0 Domains **4**

- 9.1 Introduction
- 9.2 Primary Domain Controller (PDC)
- 9.3 Backup Domain Controller (BDC)
- 9.4 Resource Server
- 9.5 Domain User Account
- 9.6 Domain Machine Account
- 9.7 Groups: Local and Global groups
- 9.8 Domain Models:
  - 9.8.1 Single Domain Model
  - 9.8.2 Trust Relationship

10.0 Overview of TCP/IP **6**

- 10.1 TCP/IP and the Internet
  - 10.1.1 TCP/IP Features
  - 10.1.2 Protocol Standards
- 10.2 A data communication model
- 10.3 TCP/IP protocol Architecture
- 10.4 Network Access Layer
- 10.5 Internet Layer
  - 10.5.1 Internet Protocol
  - 10.5.2 The Datagram
  - 10.5.3 Routing Datagrams

10.5.4 Fragmenting Datagrams
10.5.5 Passing Datagrams to the Transport Layer
10.6 Internet Control Message Protocol:
10.6.1 Flow control
10.6.2 Detecting unreachable destinations
10.6.3 Redirecting routes
10.6.4 Checking remote hosts
10.7 Transport Layer
10.7.1 User Datagram Protocol (UDP)
10.7.2 Transmission Control Protocol (TCP)
10.8 Application Layer

11.0 Delivering the Data 4

11.1 Addressing, Routing and Multiplexing
11.2 The IP Address
11.3 Address Depletion (Reduce)
11.4 Subnets
11.5 Internet Routing Architecture
11.6 The Routing Table
11.7 Address Resolution
11.8 Protocols, Ports and Sockets:
11.8.1 Protocols, Ports and Sockets:
11.8.2 Port Numbers
11.8.3 Sockets

Laboratory Exercises:

1. Network setup based on Novell Netware
2. Network setup based on Windows NT
3. Network setup based on Linux
4. Peer to peer networking using Windows
5. Setup of File Server, Web Server, DNS Server, FTP Server
6. Setup of Client/Server

References:

1. Black, "Computer Neworks"
2. A. Tanenbaum, "Computer Networks" Prentice Hall
3. C. Hunt "TCP/IP Network Administration" O'Reilly & Associates
4. Rosch, "Hardware Bible"

MICROPROCESSOR BASED INSTRUMENTATION

BEG332EC

Year: III **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**
**** Duration:** 3 hours

Course Objectives: To apply the knowledge of microprocessor, A/D, D/A and other digital hardware with concept of interfacing in design of an instrumentation system.

1. Concept Interfacing (4 hours)

1.1. Types of interfacing
1.2. Address decoding
1.3. Input/Output registers
1.4. PC Interfacing techniques

2. Parallel data transfer (8 hours)

2.1. Single and double Handshake I/O
2.2. 8255 and interface devices: block diagram, internal structures, and modes of initialization, and interfacing to a microprocessor
2.3. Microcomputer on instrumentation design
2.4. Polling and Interrupt driven data transfer

3. Interfacing A/D and D/A Converters (8 hours)

3.1. Properties of A/D and D/A converters
3.2. Functional block diagram of 8-bit and 12-bit A/D and D/A converters
3.3. Selection of A/D and D/A converters based on electronic design

4. Serial and Parallel Data Communication (8 hours)

4.1. Synchronous and Asynchronous data communication
4.2. Parity and Baud rates
4.3. Serial Interface Device: RS-232 serial data standard and interface
4.4. Simplex, half duplex and full duplex operation using RS-232 port
4.5. Connection to printer and null modem

5. Transmission and telemetry of data (5 hours)

5.1. Types of Transmission: Analog and Digital Transmission
5.2. Transmission schemes
  5.2.1. Electrical carrier
  5.2.2. Fiber optic

5.2.3. Satellite
5.2.4. Data loggers

6. Circuit Design and Layout (4 hours)

6.1. Reliability, fault tolerance, and high speed design
6.2. Impedance matching
6.3. Standard data bus and networks
6.4. Reset and power failure detection
6.5. Redundant Architecture
6.6. Timing sequence

7. Grounding and shielding (4 hours)

7.1. Importance of grounding and shielding
7.2. Single point grounding and grouped loop
7.3. Noise, noise coupling mechanism and prevention
7.4. Filtering and smoothing
7.5. Types of shielding mechanism
7.6. Line filters, isolators and transient suppressors

8. Software for instrumentation and control applications (4 hours)

8.1. Types of software, selection application
8.2. Software models and their limitations
8.3. Software reliability
8.4. Fault tolerance
8.5. Software bugs and testing

Laboratory Exercises:

1. Simple data transfer using PPIO
2. Handshake transfer using PPIO
3. Interfacing of A/D converter using PPIO
4. Interfacing of A/D converter using RS232 port
5. Interfacing of A/D converter using parallel Printer port
6. Group project based on interfacing techniques and instrumentation

References:

1. D.V. Hall, "*Microprocessor and Interfacing programming and hardware*
2. K.R. Fowler, "*Electronic Instrument Design*"
3. E.O. Duebelin, "*Measurement system application and design*"
4. Linear circuit data book dealing with A/D and D/A converters

COMPUTER GRAPHICS

BEG375CO

Year: III **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To be familiar with the basic techniques used in computer graphics systems.

1.0 Introduction: (3 hrs)

1.1 History of computer graphics

1.2 Applications of computer graphics

2.0 Hardware Concepts: (8 hrs)

2.1 Keyboard, mouse, light pen, touch screen and tablet input hardware

2.2 Raster and vector display architecture

2.3 Architecture of simple non-graphical display terminals

2.4 Architecture of graphical display terminals including frame buffer and color manipulation techniques

2.5 Advanced raster graphic architecture

3.0 Two-Dimensional Algorithms: (10 hrs)

3.1 Direct and incremental line drawing algorithms

3.2 Bresenham algorithms

3.3 Two-dimensional object to screen viewing transforms

3.4 Two-dimensional rotation, scaling and translation transforms

3.5 Recent transform concepts and advantages

3.6 *Data structure concepts and CAD packages*

4.0 Graphical Languages: (6 hrs)

4.1 Need for machine independent graphical languages

4.2 Discussion of available languages and file formats

4.3 Detailed discussion of graphical languages to be used in projects

5.0 *Project Management*: (4 hrs)

5.1 Review of project management techniques

5.2 Review of program debugging techniques

5.0 Graphical User Interface design (4 hrs)

5.1 Windows, icons, menus

5.2 Principles of interactive users dialog:-managing skill levels, consistency, loading off memory, feedback, use of metaphores.

6.0 Three-Dimensional Graphics: (10 hrs)

6.1 Three-dimensional object to screen prespective viewing transforms
6.2 Extension of two-dimensional transforms to three dimensions
6.3 Methods of generating non-planar surfaces
6.4 Hidden line and hidden surface removal techniques
6.5 Need for shading in engineering data visualization
6.6 Algorithms to simulate ambient, diffuse and specular reflections
6.7 Constant, Gouraud and Phong shading models
6.8 Specialized and future three-dimensional display architectures.

7.0 Fundamentals Of animation technique (4 hrs)

7.1 Animation Sequences
7.2 Key frame and parameterized system
7.3 Morphing

7.0 ***Project Development: (4 hrs)***

7.1 Project planning and description
7.2 Project development
7.3 Project report and presentation

Laboratory: Develop a graphical project related to engineering applications.The topic could be either initiated by the student or selected from a list provided by the instructor. An oral presentation with a demonstration should be part of the laboratory project report.

References:

1. Hearn and Baker, "*Computer Graphics*", Prentice-Hall of India Private Limited

DATABASE MANAGEMENT SYSTEMS

BEG376EC

Year: III **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: The course objective is to provide fundamental concept, theory and practices in design of database and implementation of Database Management System.

1.0 Introduction (4 hours)

1.1 Data, Database, and DBMS
1.2 Motivation, Objectives, and Evolution, Needs and organizations of database, Needs of DBMS
1.3 Data abstraction, Data independence
1.4 Schema and Instances
1.5 Database Manger and users,

2.0 Data Models (4 hours)

2.1 Logical, Physical and Conceptual model,
2.2 Hierarchical Data Model, Network Data Model
2.3 Object-based Model, E-R Model

3.0 Relational model (4 hours)

3.1 Definitions and terminology,
3.2 Structure of relational databases,
3.3 The relational algebra, the relational calculus,
3.4 Designing of relational Schemas
3.5 Trigger and Views

4.0 Relational languages (3 hours)

DDL
DML
QBE
SQL

5.0 Relational Database Design (8 hours)

5.1 Integrity constraints: keys constraint, domain constraint
5.2 Referential Integrity
5.3 Single, Multi-valued and Join Dependencies
5.4 Normalization: Role of normalization, Normal Forms

5.5 Decomposition of relational schemas

6.0 Security (3 hours)

6.1 Importance of database security
6.2 Security and integrity constraints
6.3 Access control: Discretionary and Mandatory
6.4 Authorization
6.5 Security and Views
6.6 Encryption and decryption

7.0 Query Processing (3 hours)

7.1 Introduction to query processing, query costs
7.2 Query interpretation
7.3 Equivalence of expressions, Query Optimization, Join Strategies
7.4 Query decomposition

8.0 Filing and File structure (5 hours)

8.1 Overview of storage devices
8.2 Buffer Management
8.3 Organization of records into blocks
8.4 File organizations: The sequential and the indexed sequential file organizations
8.5 B-Tree index files
8.6 Hashing and Hash function
8.7 Heap piling
8.8 Data Dictionary storage

9.0 Concurrency control (4 hours)

9.1 Needs of Database Concurrency control
9.2 Transaction and Transaction processing, Multiple Granularity
9.3 Scheduling and Serializability
9.4 Locking and Lock based protocols
9.5 Deadlock handling
9.6 Time-stamping-based protocols

10.0 Crash Recovery (4 hours)

10.1 Importance of crash recovery
10.2 Failure classification
10.3 Backup-recovery
10.4 Transaction model
10.5 Log-based recovery
10.6 Shadow paging
10.7 Dumping

11.0 Advanced database Model (3 hours)

11.1 Extended Relational Model
11.2 Object-oriented Model
11.3 Distributed Model
11.4 Multimedia Database

Laboratory:

There shall be 12 laboratory exercises based on RDBMS covering theoretical studied.

References:

1. H. F. Korth and A. Silberschatz, " *Database system concepts*", McGraw Hill
2. R. E. Mani and S. C. Nevathe, *"Fundamentals of Database Systems*", Benjamin/Cummings Publishing Co. Inc.
3. A. K. Majumdar and P. Bhattacharaya, "*Database Management Systems*", Tata McGraw Hill, India
4. G.C. Everest, "*Database Management*", McGraw Hill

ENGINEERING ECONOMICS
BEG495MS

Year: III **Semester: II**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration Hours	Marks	Duration Hours	Marks				
3	--	1	3	80	--	--	20	--	100	

Course objectives: To provide the students a knowledge of the basic tools and methodology of economic studies for evaluation engineering project in private industry, in the public sector and in the utilities area**.**

1.0 Introduction (3 Hours)

1.1 Business and accounting terminology
1.2 Cash flow
1.3 Economic systems

2.0 Cost Classification and Analysis (5 Hours)

2.1 The elements of cost
2.2 Classification of cost: overhead cost, prime cost
2.3 Cost variance analysis
2.4 Job and process costing

3.0 Interest and the Time Value of Money (6 Hours)

3.1 Simple interest, compound interest, interest tables, interest charts
3.2 Present worth
3.3 Nominal and effective interest rates
3.4 Continuous compounding and continuous compounding formula
3.5 Interest calculations for uniform gradient

4.0 Basic Methodologies of Engineering Economic Studies (7 Hours)

4.1 Present worth and annual worth methods
4.2 Future worth method
4.3 Internal rate of return method
4.4 Drawbacks of the internal method
4.5 External rate of return method
4.6 Minimum attractive rate of return method
4.7 The playback (pay-out) period method

5.0 Cost/Benefit Analysis (4 Hours)

5.1 Conventional cost/benefit ratio
5.2 Modified cost/benefit ratio
5.3 Break-even analysis

6.0 Investment Decisions: (8 Hours)

6.1 Comparison of alternatives having some useful life
6.2 Comparison of alternatives having different useful life
6.3 Comparison of alternatives including of excluding the time value of money
6.4 Comparison of alternatives using the capitalized worth method
6.5 Definition of mutually exclusive investment alternatives in terms of combinations of projects
6.6 Comparison of mutually exclusive alternative

5.0 Risk Analysis: (4 Hours)

5.1 Projects operating under conditions of certainty
5.2 Projects operating under conditions of uncertainty
5.3 Decision tree
5.4 Sensitivity analysis

6.0 Taxation System in Nepal: (3 Hours)

6.1 Taxation law in Nepal
6.2 Depreciation rates for buildings, equipment, furniture, etc
6.3 Recaptured depreciation
6.4 Taxes on normal gains
6.5 Taxes on capital gains
6.6 VAT

9.0 Demand Analysis and Sales Forecasting (5 Hours)

9.1 Demand analysis
9.2 Correlation of price and consumption rate
9.3 Multiple correlation of price and consumption rate
9.4 Market research
9.5 Sales forecasting
9.6 Criteria for desirable sales forecasting procedures
9.7 Factors affecting accuracy of forecasting

Tutorials:

3 Assignments, 2 Quizzes, 3 Case Studies

Note:

The case studies will concentrate on economic analysis and selection of public projects, economic analysis and selection of private projects, risk analysis and demand analysis.

Recommended books:

1. E.P. DeGramo, W.G. Sullivan and J.A. Bontadelli, 8th Edition, Macmillan Publishing Company, 1988

1 N.N. Borish and S.Kaplan, "Economic Analysis: For Engineering and Managerial Decision Making", McGraw-Hill.

BE Fourth Year Detail Semester

4th Year 1st Semester

&

4th Year 2nd Semester

WEB PROGRAMMING TECHNIQUE

BEG470CO

Year: IV **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	-	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objective: To provides concept of web page development using HTML and Programming languages such as Pearl, CGI scripting, JavaScript and Java

1. HTML **5**

- 1.1 Introduction to HTML
- 1.2 HTML-a scripting language for formatting web page
- 1.3 HTML-Assistants, Editors, Converters, Images and Multimedia, Effective Web page design, Tables, Frames, Going On-Line, Image Maps, Dynamic HTML and Style sheets
  - 1.3.1 Linking Documents

2. VB Script **5**

- 2.1 Introduction to VBScript
- 2.2 Tools used with VBScript
- 2.3 The VBScript Language
- 2.4 Using VBScript in Internet Explorer

3. JavaScript **20**

- 3.1 Introduction to JavaScript
  - 3.1.1 Comparing JavaScript to Java
  - 3.1.2 JavaScript in Web Pages
  - 3.1.3 Netscape and JavaScript
  - 3.1.4 Database connectivity
  - 3.1.5 Client side JavaScript
  - 3.1.6 Capturing User Input
- 3.2 Features and advantages of JavaScript
- 3.3 Writing JavaScript into HTML
- 3.4 Building up JavaScript Syntax
- 3.5 The JavaScript into HTML
- 3.6 Building up JavaScript Syntax
- 3.7 The JavaScript Document Object Model
- 3.8 Cookies
- 3.9 JDK
- 3.10 Interfacing Java and JavaScript

4. Common Gateway Interface (CGI) 5

- 4.1 Introduction to CGI Programming
  - 4.1.1 How CGI is used within the HTML
- 4.2 Information from the Web Browser to a CGI program
- 4.3 CGI URL interpretation with Web Server
- 4.4 How a CGI program returns information to the Server
- 4.5 Processing Form Information in a CGI program
- 4.6 Security Issues regarding CGI scripts

5. PERL 10

- 5.1 Introduction to PERL language
- 5.2 PERL Basics
- 5.3 PERL Strings
  - 5.3.1 Single and Double Quoted Strings
- 5.4 Data Storage
  - 5.4.1 Variables, Scalar Variables
- 5.5 Arrays
- 5.6 Database Connectivity
- 5.7 Debugging in Perl
- 5.8 Writing CGI scripts in the language PERL to process information from HTML forms

Laboratory:

There shall be lab exercises to cover all the theoretical aspects of Web Technology.

References:

1. HTML,DHTML,JavaScript PERL CGI
   -IVAN Bayross(2nd Revised Edition,BPB)
2. Learning PERL
   -Rendal L. Schwartz & Tom Christiansen (O'Reilly & Associates)
3. PERL and CGI for the World Wide Web
   -Elizabeth Castro(Peachpit Press)
   -Herbert Schildt (Tata McGraw-Hill)

ORGANIZATION AND MANAGEMENT

BEGEC

Year: IV **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
2	-	-	10	-	40	-	50

*** Continuous**

**** Duration:** 1.5 hours

Course Objectives: the objective of this course is to make the students understand and analyze the professional environment where they have to practice their profession..

1. Introduction **(3 hours)**

1.1. Organization and Management

1.2. Functions and roles of management

2. Organization **(4 hours)**

2.1. Organization and its characteristics

2.2. Formal and informal organization

2.3. Organization chart and types of organization

3. Leadership and Motivation **(8 hours)**

3.1. Motivation and incentives

3.2. Theories of motivation

3.3. Leadership styles

3.4. Management by objectives

3.5. Management by exception.

4. Personnel Management **(8 hours)**

4.1. Functions of personnel management

4.2. Job analysis and description

4.3. Recruitment and promotion

4.4. Performance appraisal

4.5. Wages and methods of wage payment

4.6. Upgrading and Training

5. Industrial Relations **(7 hours)**

5.1. Necessity of relationship

5.2. Trade union and Trade union movement in Nepal

5.3. Collective bargaining

5.4. Health, safety and compensation

5.5. Arbitration

References:

1. Essentials of Management by Harold Koontz and Heinz Weihrich
2. Organization and Management in Nepal by Govinda Ram Agrawal
3. Personnel Management by C. B. Mamoria
4. The Economics of Development and Planning by M. L. Jhingan
5. Modern Economic Theory by K. K. Dwett

ARTIFICIAL INTELLIGENCE

BEG471CO

Year: IV **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: To provide fundamental knowledge of Artificial Intelligence, Machine Learning, Natural Language, Expert Systems and Neural Network.

1. Problem-solving: (5 hours)

1.1. Problem solving goal schemes: use in planning
1.2. Concept of non-linear planning
1.3. Means–end analysis
1.4. Production rules systems: forward and backward chaining
1.5. Mycin-style probabilities and its application

2. Intelligence (5 hours)

2.1. Intelligence
2.2. Modeling humans vs. engineering intelligence
2.3. Representing intelligence using and acquiring knowledge

3. Knowledge Representation (5 hours)

3.1. Logic
3.2. Semantic networks
3.3. Predicate calculus
3.4. Frames

4. Inference and Reasoning (7 hours)

4.1. Inference theorems
4.2. Deduction and truth maintenance
4.3. Heuristic search State-space representations
4.4. Game playing
4.5. Reasoning about uncertainty
4.6. Probability, Bayesian networks, Case-based Reasoning

5. Machine Learning (7 hours)

5.1. Concepts of learning
5.2. Learning by analogy, Explanation based learning
5.3. Inductive bias learning
5.4. Neural networks

5.5. Genetic algorithms and Boltzmann Machines

6. AI application (16 hours)

6.1 Neural networks: Network Structure, Adaline, Madaline, Perceptron, Multi-layer network, Radial Basis Function, Hopfield network, Kohonen Network, Elastic network model, back-propagation

6.2 Expert Systems: structure of Expert system, Knowledge acquisition and induction, Knowledge representation, Declarative and Procedural knowledge elicitation techniques, Development of expert systems

6.3 Natural language Processing: Levels of analysis: Phonetic, syntactic, semantic, pragmatic, Machine Vision: edge extraction, line detection, line labeling, shape recognition, image interpretation, hypothesis-driven approaches.

Laboratory:

Laboratory exercises should cover the design and development of artificial intelligence.

References:

1. Haykin "Neural Networks: *A Comprehensive Fundamentals"*, Macmillan, 1994
2. E. Turban, "*Decision Support and Expert Systems"* , Macmillan, 1993
3. G. Gazadar & C. Mellish, "*Natural Language Processing in Prolog: and introduction to computational linguistics"*, Addison-Wesley, 1989
4. D. Crookes, "*Introduction to Programming in Prolog"*, Prentice Hall, 1988.
5. Beale & Jackson "*Neural Computing"* , Aam Higler, 1990
6. Hecht-Neilson "*Neurocomputing"*, Addison-Wesley, 1990

SOFTWARE ENGINEERING

BEG472CO

Year: IV **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**1**	**-**	20	-	80	-	100

*** Continuous**

**** Duration:** 3 hours

Course Objectives: This course provides a systematic approach towards planning, development, implementation and maintenance of software.

1. Introduction to Software Engineering **(3 hours)**

1.1. Software products
1.2. The software process
1.3. Boehm's spiral model
1.4. Process visibility
1.5. Profession responsibility

2. Computer-based System Engineering **(5 hours)**

2.1. Systems and their environment
2.2. System procurement
2.3. The system engineering process
2.4. System architecture modeling
2.5. Human factors
2.6. System reliability engineering

3. System analysis and design **(5 hours)**

3.1. System concept
3.2. System analysis
3.3. Methodology and standards
3.4. Expression of a need
3.5. Preliminary Investigation and Feasibility study
3.6. System design
3.7. Systems Development Life Cycle
3.8. Implementation

4. Program Development **(5 hours)**

4.1. Tasks of program development
4.2. Problem Definition
4.3. Coding
4.4. Debugging
4.5. Testing
4.6. Implementation

4.7. Documentation
4.8. Maintenance
4.9. Extension and Redesign

5. Software design (5 hours)

5.1. The design process
5.2. Design strategies
5.3. Design quality
5.4. System structuring
5.5. Control models
5.6. Modular decomposition
5.7. Domain-specific architectures
5.8. Data-flow design
5.9. Structural Decomposition
5.10. Detailed design
5.11. A comparison of design strategies

6. Object -Oriented analysis and Data Modeling (5 hours)

6.1. Object-oriented concepts
6.2. Object-oriented analysis modeling
6.3. Data modeling

7. Object-Oriented design (6 hours)

7.1. Objects, object classes and inheritance
7.2. Object identification
7.3. An object-oriented design example
7.4. Concurrent objects

8. Software quality and quality assurance (6 hours)

8.1. Software quality assurance planning
8.2. Software quality assurance process
8.3. Software quality attributes
8.4. Guidelines and checklists
8.5. Software safety

9. Software reliability (3 hours)

9.1. Reliability definitions
9.2. Reliability models
9.3. Software faults
9.4. Design rules
9.5. System reliability and availability requirements
9.6. Applications of a software reliability model
9.7. Redundancy and fault tolerance
9.8. Failure modes and effects other analysis tools

10. Verification and Validation techniques (2 hours)

10.1. The testing process
10.2. Test planning
10.3. Testing strategies
10.4. Defect testing
10.5. Static verification

Laboratory Exercises:

Student must to do one software project in any computer programming. The choice of project title depends upon the class teacher or by student.

References:

1. Richard Fairley, " Software Engineering"
2. Robernt J. Thieraus, " Systems analysis and design"
3. Dr. A.K. Gupta, and S.K. Sarkar, " System Analysis, Data Processing Quantitative Techniques"

PROJECT MANAGEMENT
BEG394MS

Year: IV **Semester: I**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration Hours	Marks	Duration	Marks				
3	0	1	3	80	--	--	20	--	100	

Course Objective: To provide students with fundamental principles and basic tools and methodology of initiating, planning, scheduling and controlling of the projects

1. Introduction: 3 Hours

1.1 Project Definition
1.2 Project Cycles, Project Phases
1.3 Setting of Project Objectives and Goals

2 Pre Project Work: 2 Hours

2.1 Feasibility Study
2.2 Project Appraisal
2.3 Project Proposal

2. Project Planning: 18 Hours

3.1 Definition
3.2 Planning Function
3.3 Network models - CPM/PERT
3.4 Goal Oriented Project Planning (ZOPP Planning)
3.5 Project Scheduling with limited resources
3.6 Wiest's Algorithm
3.7 Manpower levelling
3.8 Materials scheduling
3.9 Multi project scheduling
3.10 Mathematical programming for minimum cost or maximum project return
3.11 Plan of operation and its different forms of presentation

4. Project Monitoring and Evaluation (M&E) and Control 8 Hours

4.1. Definition of M&E

4.2. Method and technique in M&E
4.3. Technique in formulating monitoring indicators
4.4. Controlling systems
4.5. Project control cycle
4.6. Feedback control system
4.7. Cost control
4.8. Work breakdown structure
4.9. Project Management Information System

5. Capital Planning and Budgeting: 10 Hours

5.1. Capital Planning Procedure
5.2. Operating and Capital budget
5.3. Fixed and Flexible Budget
5.4. Revision of Budget
5.5. Budget control method (Audit)

6. Impact Analysis: 4 Hours

6.1 Social Impact Analysis
6.2 Environmental Impact Analysis
6.3 Economic Impact Analysis

Recommended Books:

1. Arnold M. Ruskin and W. Eugene Estes, "Project Management", Marcel Dekker Publishers, 1982.

2. Joseph J. Moder and Cecil R. Philips, "Project Management with CPM and PERT", Van Nostrand Reinhold Publishers, Latest edition

3. L. S. Srinath, "PERT and Application", East-West Press.

4. A. Bhattacharyya and S. K. Sorkhel, "Management by Network Analysis", The Institutions of Engineers, India

5. Prasanna Chandra, "Projects: Preparation, Appraisal, Implementation", Tata McGraw Hill Publishing Company Ltd. New Delhi

SIMULATION AND MODELING

BEG474CO

Year: IV **Semester: I**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3**	20	50	80	-	150

*** Continuous**

**** Duration:** 3 hours

Course Objectives: This course provides the discrete and continuous system, generation of random variables, and analysis of simulation output and simulation languages.

1. Concepts of Simulation **(6 hours)**

1.1. Introduction
1.2. The system
1.3. Continuous and discrete systems
1.4. System simulation
1.5. Real time simulation
1.6. When to use Simulation
1.7. Types of Simulation Models
1.8. Steps in simulation Study
1.9. Phases of a simulation study
1.10. Advantages of simulation
1.11. Limitations of the Simulation Technique
1.12. Areas of applications

2. Monte Carlo Method **(4 hours)**

2.1. Monte Carlo Method
2.2. Normally distributed random number
2.3. Monte Carlo Method V/S Stochastic Simulation

3. Simulation of Continuous Systems **(5 hours)**

3.1. **Manual Simulation**
3.2. A pure Pursuit Problem
3.3. Queuing system
3.4. Markov chains
3.5. Differential and partial differential equations

4. Random Numbers **(10 hours)**

4.1. Random Numbers
4.2. Random Number Tables
4.3. Pseudo Random Numbers

4.4. Generation of Random Numbers
4.5. Mid square Random Number generator
4.6. Qualities of an efficient Random Number Generator
4.7. Testing Numbers for Randomness
4.8. Uniformity Test
4.9. Chi-square test
4.10. Testing for auto correlation
4.11. Poker Test

5. Analysis of simulation output (10 hours)

5.1. Estimation methods
5.2. Simulation run statistics
5.3. Replication of runs
5.4. Elimination of internal bias

6. Simulation languages (10 hours)

6.1. Basic concept of Simulation tool
6.2. Discrete systems modeling and simulation
6.3. Continuous systems modeling and simulation
6.4. Structural, data and control statements, hybrid simulation
6.5. Feedback systems: typical applications

Laboratory Exercises:

Laboratory exercises using simulation and modeling packages, at the end of this course last student must do a project on simulation using simulation and modeling package.

References:

1. G. Gorden, " System Simulation", Prentice Hall of India
2. M. Law and R.F. Perry, " Simulation : A problem-solving approach", Addison Wesley publishing company.
3. M. Law and W.D. Kelton, " Simulation Modeling and analysis", McGraw Hill, 1991.

Prepared by: Dharmendra Mishra(Acme Engineering College)

IMAGE PROCESSING AND PATTERN RECOGNITION

BEG476CO

Year: IV **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course Objectives: to provide the knowledge of image processing and pattern recognition and their applications**.**

1. Introduction to Digital Image Processing: (4 hrs)

1.1 Digital image representation

1.2 Digital image processing: problems and applications

1.3 Elements of visual perception

1.4 Sampling and quantization, relationships between pixels

2. Two-Dimensional Systems: (5 hrs)

2.1 Fourier transform and Fast Fourier Transform

2.2 Other image transforms and their properties: Cosine transform, Sine transform, Hadamard transform, Haar transform

3. Image enhancement and restoration: (8 hrs)

3.1 Point operations, contrast stretching, clipping and thresholding, digital negative, intensity level slicing, bit extraction

3.2 Histogram modeling: equalization modification, specification

3.2 Spatial operations: averaging, directional smoothing, median, filtering spatial low pass, high pass and band pass filtering, magnification by replication and interpolation

4. Image coding and compression: (4 hrs)

4.1 Pixel coding: run length, bit plan

4.2 Predictive and inter-frame coding

5. Introduction to pattern recognition and images: (3 hrs)

6. Recognition and classification: (5 hrs)

6.1 Recognition classification
6.2 Feature extraction
6.3 Models
6.4 Division of sample space

7.0 Grey level features edges and lines: (6 hrs)

7.1 Similarity and correlation
7.2 Template matching
7.3 Edge detection using templates
7.4 Edge detection using gradient models
7.5 Model fitting, line detection, problems with feature detectors

8. Segmentation: (3 hrs)

8.1 Segmentation by thresholding
8.2 Regions for edges, line and curve detection

9. Frequency approach and transform domain: (3 hrs)

10. Advanced Topics: (4 hrs)

10.1 Neural networks and their application to pattern recognition
10.2 Hopfield nets
10.3 Hamming nets, perceptron

Laboratory:

Laboratory exercises using image processing and pattern recognition packages.

Reference books:

1. K. Castlemann, "*Digital image processing*", Printice Hall of India Pvt. Ltd., 1996.
2. A. K. Jain, "Fundamental of Digital Image processing", Printice Hall of India Pvt. Ltd., 1995.
3. R. C. Gonzalez and P. Wintz, "*Digital Image Processing*", Addison-Wesley Publishing, 1987.
4. Sing_tze Bow, M. Dekker, "*Pattern recognition and Image Processing*", 1992
5. M. James, "*Pattern recognition*", BSP professional books, 1987.
6. P. Monique and M. Dekker, "*Fundamentals of Pattern recognition*", 1989.

ENGINEERING PROFESSIONAL PRACTICE

BEG459CI

Year: IV **Semester: II**

Teaching Schedule Hours/ week			Examination Scheme						Total Marks	Remarks
			Final				Internal Assessments			
			Theory		Practical		Theory Marks	Practical Marks		
L	P	T	Duration Hours	Marks	Duration	Marks				
2	--	--	1.5	40	--	--	10	--	50	

Course objectives: To introduce the ethical and legal environment in which engineering is practiced**.**

1.0 Historical Background: 2 Hours

1.1 History of engineering practice in eastern society
1.2 History of engineering practice in western society
1.3 Key roles of engineers in the development activities
1.4 Individual freedoms vs societal goals

2.0 Engineering Professionalism: 2 Hours

2.1 Engineering morals, ethics and professionalism
2.2 Codes of ethics and guidelines for engineering profession
2.3 Relationship of the engineering profession to basic science and technology; relationship to other professions

3.0 Engineering professional practice sectors in Nepal: 4 Hours

3.1 Public sectors: Government organizations like ministries, departments, regional and district offices, corporations, Institute of Engineering etc
3.2 General job description of engineers working in the public sectors
3.3 Private sectors: Constructions companies, Consulting companies, private engineering colleges etc
3.4 General job description of the engineers working in the private sectors

4.0 Engineering Profession Practice in Nepal: 12 Hours

4.1 The Engineering Council Act 2057
4.2 System of provision for private practice and for employee engineers
4.3 Contract law
4.4 Preparation of Tender Document and Tendering process
4.5 Finalization of Contract documents
4.6 Approval of contract agreement
4.7 Community based engineering project launching procedures
4.8 User's Group Formation and Community participation in development activities
4.9 Liability and negligence

4.10 Business and labour laws
4.11 Personnel and financial regulations; Tippani system
4.12 Norms adopted for the construction of building, highway, irrigation etc
4.13 Duties, Responsibilities, Authority and Power delegation system
4.14 Relationship to foreign firms working in Nepal

5.0 Engineering Professional Practice in Other Countries: 2 Hours

5.1 Other Asian countries
5.2 The USSR and Eastern Europe
5.3 Western Europe
5.4 North America

7.0 Issues on engineering professional ethics: 8 Hours

6.1 Intellectual property rights: copyrights and patent protection
6.2 Personal property and large computerized data bases
6.3 Industrialization vs protection of the environment
6.4 Risk/benefit considerations in public transportation
6.5 Engineers and the military
6.6 Science and technology for medicine
6.7 Engineers in international development

Recommended Books:

1.0 Carson Morrison and Philip Hughes, "Professional Engineering Practice – Ethical Aspects", McGraw-Hill Ryerson Ltd., Totanto, 1982

DIGITAL SIGNAL PROCESSING

BEG433EC

Year: IV **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**

**** Duration:** 3 hours

Course objectives: To provide fundamental knowledge of digital signal processing techniques and applications.

1.0 Discrete Signals: (5hours)

1.1 Discrete signals - unit impulse, unit step, exponential sequences
1.2 Linearity, shift invariance, causality
1.3 Convolution summation and discrete systems, response to discrete inputs
1.4 Stability, sum and convergence of power series
1.5 Sampling continuous signals - spectral properties of sampled signals

2.0 The Discrete Fourier Transform: (5 hours)

2.1 The discrete Fourier transform (DFT) derivation
2.2 Properties of the DFT, DFT of non-periodic data
2.3 Introduction of the Fast Fourier transform (FFT)
2.4 Power spectral density using DFT/FFT algorithms

3.0 Z-Transform: (8 hours)

3.1 Definition of the Z-transform, one-sided and two-sided transforms
3.2 Region of convergence, relationship to causality
3.3 Inverse Z-transform - by long division, by partial fraction expansion
3.4 Z-transform properties - delay, advance, convolution, Parseval's theorem
3.5 Z-transform transfer function H(Z) - transient and steady state sinusoidal response, pole-zero relationships, stability
3.6 General form of the linear, shift-invariant constant coefficient difference equation
3.7 Z-transform of difference equation

4.0 Frequency Response (4 hours)

4.1 Steady state sinusoidal frequency response derived directly from the difference equation
4.2 Pole-zero diagrams and frequency response
4.3 Design of a notch filter from the pole-zero diagram

5.0 Discrete Filters: (6 hours)

5.1 Discrete filter structures, second order sections, ladder filters, frequency response
5.2 Digital filters, finite precision implementations of discrete filters
5.3 Scaling and noise in digital filters, finite quantized signals, quantization error, linear models

6.0 IIR Filter Design: (7 hours)

6.1 Classical filter design using polynomial approximations - Butterworth, Chebyshev
6.2 IIR filter design by transformation - matched Z-transform, impulse-invariant transform and bilinear transformation
6.3 Application of the bilinear transformation to IIR lowpass discrete filter design
6.4 Spectral transformations, highpass, bandpass and notch filters

7.0 FIR Filter Design: (7 hours)

7.1 FIR filter design by Fourier approximation, the complex Fourier series
7.2 Gibbs phenomena in FIR filter design approximations, applications of window functions to frequency response smoothing, rectangular, Hanning, Hamming and Kaiser windows
7.3 FIR filter design by the frequency sampling method
7.4 FIR filter design using the Remez exchange algorithm

8.0 Digital Filter Implementation: (3 hours)

8.1 Implementations using special purpose DSP processors, the Texas Instruments TMS320
8.2 Bit-serial arithmetic, distributed arithmetic implementations, pipelined implementations

Laboratory:

1.0 Introduction to digital signals - sampling properties, aliasing, simple digital notch filter behaviour
2.0 Response of a recursive (IIR) digital filter - comparison to ideal unit sample and frequency response, coefficient quantization effects
3.0 Scaling, dynamic range and noise behaviour of a recursive digital filter, observation of nonlinear finite precision effects

ADVANCED COMPUTER ARCHITECTURE

BEG477CO

Year: IV **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory****	**Practical**	
3	**-**	**3/2**	20	25	80	-	125

*** Continuous**
**** Duration:** 3 hours

Course Objectives: To Gain the knowledge needed to design and analyze high performance computer architectures.

1. Computational Models **3 Hours**

1.1 The concept of computational model
1.2 Basic Computational models
1.3 The Von Neumann computational Model
1.4 Key Concepts relating to computational models

2. The Concept of Computer Architecture **4 Hours**

2.1 Evolution and interpretation of the concept
2.2 Interpretation of the concept of computer architectures at different levels of abstraction
2.3 The concept of computer architecture as a multilevel hierarchical framework
2.4 Extensions to the interpretation of the concept
2.5 Description of computer architectures
2.6 Amdahl's Law and its application

3. Introduction to parallel Processing **4 hours**

3.1 Basic concepts
3.2 Types and levels of parallelism
3.3 Classification of parallel architectures
3.4 Basic parallel techniques
3.5 Relation between languages and parallel

4. Introduction to ILP -Processors **3 Hours**

4.1 Evolution and overview of ILP-processors
4.2 Dependencies between instructions
4.3 Instruction scheduling
4.4 Preserving sequential consistency
4.5 The speed-up potential of ILP-processing

5. Pipelined Processors **4 Hours**

5.1 Basic concepts
5.2 Design space of pipelines

5.3 Overview of pipelined instruction processing
5.4 Pipelined execution of integer and Boolean instructions
5.5 Pipelined processing of loads and stores

6. Superscalar Processors **5 Hours**

6.1 Basic concepts
6.2 Parallel decoding
6.3 Superscalar instruction issue
6.4 Shelving
6.5 Register renaming
6.6 Parallel execution
6.7 Preserving the sequential consistency of instruction execution
6.8 Implementation of superscalar CISC processors using a superscalar RISC core
6.9 Case studies of superscalar processors

7. SIMD Architectures **5 Hours**

7.1 Basic concepts
7.2 Design Space
7.3 Fine-grained SIMD architectures
7.4 Coarse-grained SIMD architectures

8. Associative and Neural architectures **4 Hours**

8.1 Basic Concepts
8.2 Associative processing
8.3 Application of array mapping
8.4 Neural computers

9. Vector architectures **5 Hours**

9.1 Basic Concepts
9.2 Word length
9.3 Vectorization
9.4 Pipelining
9.5 Parallel computing streams
9.6 The Cray family
9.7 The Convex C4/XA system

10. MIMD Architectures **8 Hours**

10.1 Basic concepts
10.2 Direct interconnection networks
10.3 Fine-grain systems
10.4 Medium-grain system
10.5 Coarse-grain multicomputers
10.6 Dynamic interconnection networks
10.7 Cache coherence
10.8 Synchronization and event ordering in multi-processors
10.9 Uniform memory access (UMA) machines

10.10 Non-uniform memory access(NUMA) machines
10.11 Cache-coherent non-uniform memory access (CC-NUMA) machines
10.12 Cache-only memory architectures (COMA) machines

Laboratory: Student will be required to design a project based on the Advanced Computer Architecture.

References:

1. Andrew S. Tanenbaum , " Structured Computer Organization", Fourth Edition, 1999
2. David A. Patterson , John L. Hennessy, "Computer Organization and Design ", Second Edition, 2000.
3. Garry Wilkinson ,"Computer Architecture Design and Performance ".
4. A.J . Vande Goor , " Computer Architecture and Design".
5. W. Stalling ,"Computer Organization and architecture "

Prepared by: Dharmendra Mishra (Acme Engineering College)

PROJECT COURSE

BEG480CO

Year: IV **Semester: II**

Teaching Schedule Hours/Week			Examination Scheme				
Theory	**Tutorial**	**Practical**	**Internal Assessment**		**Final**		**Total**
			Theory	**Practical***	**Theory**	**Practical ****	
-	-	**6**	-	120		80	200

*** Continuous**
****Final presentation 3 hours.**

Course objectives: The objective of this project work is to give knowledge on project planning, designing, reporting and presentation skill. Student should plan and complete an individual computer engineering design project under the supervision of teacher and prepare project reports.

Procedures:

1.0 A detailed project proposal not exceeding 10 double-spaced pages submitted to the concerned department within two weeks of the start of the project course. The department then will consult possible supervisor for approval of proposal. This proposal will be evaluated by the supervisor. This proposal carry the 10% of project final marks and this marks will be given by the project supervisor.

2.0 A mid-term progress report not exceeding 12 double-spaced pages shall be submitted before the end of the 8th week of the term. An oral presentation will take place during the 9th week of term. This mid-term written and oral reports will account for 25% of the final marks.

3.0 Final report minimum of 25 double-spaced pages will be submitted at the end of the 15th week of the term. This report will be evaluated by the project supervisor. This report carry 40% of final marks.

4.0 An oral presentation of the final report to be conducted during the 16th week of the term by a panel of external examiner. The oral defense carry 25% of the final marks.