CURRICULUM
CHOICE BASED CREDIT SYSTEM

EVALUATION SCHEME

AND

COURSE OF STUDY

ACCORDING TO AICTE MODEL CURRICULUM

IN

B.TECH – I AND II YEAR

ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
16 July 2019

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

VISION

To become an excellence in higher education and learning center, that will provide inter disciplinary knowledge with impartment of human values and professional ethics among the youth, so as to serve as a valuable resource for industry and human society.

MISSION

"Educate everyone for technological transformation"

Motivate the students to serve the nation and globe by their knowledge in the field of Electronics and Communication Engineering and the allied areas through constant interaction with research organizations and industries.

CORE VALUES

Ethics, Human Values, Professionalism, Commitment, Integrity, Team Work and Innovation.

Program Objectives

1. To provide students with strong foundation in basic sciences, Vedic knowledge, mathematics, computing, engineering principles and human values.
2. To confer in profundity information in center zones ofElectronics and Communication Engineering so as to comprehend, analyze, design, and create novel products and solutions for various real life problems.
3. To provide students with an academic environment to promote teamwork, ethics, multidisciplinary approach and lifelong learning required for a successful professional carrier.

Program Outcomes

1. Impart knowledge of mathematics, sciences, and engineering fundamentals in the domain of Electronics and Communication Engineering.
2. Potential to analyze an engineering problem and formulate its suitable solution.
3. Ability to design systems and processes that met the requirements of public safety and offer solutions for societal and environmental issues.
4. Ability to formulate and analyze complex engineering problems by using mathematical principles and engineering fundamentals.
5. Select appropriate techniques and modern automation tools for the system design and analysis.
6. Skills to develop environment friendly and sustainable solutions.
7. Understanding and commitment towards professional ethics, responsibilities and norms of engineering practices so as to become good citizens.
8. Ability to function effectively, individually and in a team.
9. Proficiency in communication, both verbal and written forms, which will enable them to complete globally.
10. Recognize the need for and have the ability to engage in independent and lifelong learning and hence participate and succeed in competitive examinations, higher studies etc.
11. Willingness and ability to take up administrative responsibilities involving both project and financial management confidently.
12. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

(Effective from the academic session 2019-20)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-I

DSC/SEC/DSE /AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BAP-C102	Engineering Physics	3	1	0	20	10	30	70	100	4
BEM-C102	Engineering. Mathematics– I	3	1	0	20	10	30	70	100	4
BET-C102	Electronic Devices	3	1	0	20	10	30	70	100	4
BEE-C102	Basic Electrical Engineering	3	1	0	20	10	30	70	100	4
		TOTAL CREDITS								16
BHU-S102	Vedic Science and Engineering	2	0	0	20	10	30	70	100	0
	Induction Program	for first three weeks								0
PRACTICAL										
BAP-C151	Engineering Physics Lab	0	0	2	10	5	15	35	50	1
BET-C151	Electronic Devices Lab	0	0	2	10	5	15	35	50	1
BEE-C151	Basic Electrical Engineering Lab	0	0	2	10	5	15	35	50	1
BME-C152	Workshop Practice	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
BSP-S151	Physical Training and Yoga	0	0	2	10	5	15	35	50	0
TOTAL		14	4	10	120	60	180	420	750	20

(Effective from the academic session 2019-20)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-II

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BAC-C202	Engineering Chemistry	3	1	0	20	10	30	70	100	4
BEM-C202	Engineering Mathematics – II	3	1	0	20	10	30	70	100	4
BCE-C202	Programming for Problem Solving	3	1	0	20	10	30	70	100	4
BME-C203	Basic Mechanical Engineering	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
BEN-A203	Environmental Studies	2	0	0	20	10	30	70	100	0
PRACTICAL										
BAC-C251	Engineering Chemistry Lab	0	0	2	10	5	15	35	50	1
BCE-C251	Programming for Problem Solving Lab	0	0	2	10	5	15	35	50	1
BME-C253	Engineering Graphics and Design Lab	1	0	2	10	5	15	35	50	2
BEG-A251	Technical Communication Lab	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								5
TOTAL		15	3	8	120	60	180	420	700	20

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after II semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in III semester. Also the students have to present PPT of the industrial training/mini project/internship for presentation in the department.

(Effective from the academic session 2020-21)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-III

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BEM-C302	Engineering Mathematics-III	3	1	0	20	10	30	70	100	4
BET-C305	Analog Communication	3	0	0	20	10	30	70	100	3
BCE-C305	Data Structure-I	3	0	0	20	10	30	70	100	3
BCE-C306 CSE/EC	Computer Architecture and Organization	3	0	0	20	10	30	70	100	3
BET-C306	Digital System Design	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								16
PRACTICAL										
BET-C354	Analog Communication Lab	0	0	2	10	5	15	35	50	1
BCE-C355	Data Structure-I Lab	0	0	2	10	5	15	35	50	1
BET-C355	Digital System Design Lab	0	0	2	10	5	15	35	50	1
BET-S359	Summer Training and Internship Program-I/mini project (3-4 weeks)	To be pursued during summer vacation, submit a certificate of completion in the department (in summer break after II semester exam and will be assessed during III semester)							50	1
		TOTAL CREDITS								4
TOTAL		15	1	6	130	65	195	455	700	20

(Effective from the academic session 2020-21)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-IV

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C410	Digital Communication	3	0	0	20	10	30	70	100	3
BEE-C406	Electrical Circuits Analysis	3	0	0	20	10	30	70	100	3
BET-C411	Microprocessor and Interfacing	3	0	0	20	10	30	70	100	3
BET-C412	Electromagnetic waves	3	0	0	20	10	30	70	100	3
BET-C413	VLSI Design and Technology	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
BKT-A403	Bharteeya Jnanaparampara	2	0	0	20	10	30	70	100	0
PRACTICAL										
BET-C461	Microprocessor Lab	0	0	2	10	5	15	35	50	1
BET-C462	Circuit Simulation Lab	0	0	2	10	5	15	35	50	1
BET-C463	Digital Communication Lab	0	0	2	10	5	15	35	50	1
BET-C482	Seminar	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
TOTAL		17	0	8	160	80	240	560	800	19

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after IV semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in V semester. Also the students have to present PPT of the industrial training/mini project/internship.

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – III and IV YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
09 July 2021
(w.e.f. Batch 2019 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

(Effective from the academic session 2021-22)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Third Year (SEMESTER-V)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-V

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C510	Signals & Systems	3	0	0	20	10	30	70	100	3
BET-C511	Analog Circuits	3	0	0	20	10	30	70	100	3
BET-C512	Electronics Measurement and Instrumentation	3	0	0	20	10	30	70	100	3
BET-C513	Control System	3	0	0	20	10	30	70	100	3
BET-M001	Universal Human Values	3	0	0	20	10	30	70	100	3
BCE-P515	Object Oriented Programming using C++	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								18
PRACTICAL										
BET-C561	System Engineering Lab	0	0	2	10	5	15	35	50	1
BET-C562	Analog Circuits Lab	0	0	2	10	5	15	35	50	1
BET-C563	Electronics Measurement and Instrumentation Lab	0	0	2	10	5	15	35	50	1
BET-S559	Summer Training and Internship Program-II/mini project (3-4 weeks)	To be pursued during summer vacation, submit a certificate of completion in the department(in summer break after IV semester exam and will be assessed during V semester)							50	1
		TOTAL CREDITS								4
TOTAL		18	0	6	150	75	225	525	800	22

(Effective from the academic session 2021-22)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Third Year (SEMESTER-VI)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VI

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C610	Embedded systems	3	0	0	20	10	30	70	100	3
BCE-C637	JAVA Programming and Introduction of Python	3	0	0	20	10	30	70	100	3
BET-C612	Digital Signal Processing	3	0	0	20	10	30	70	100	3
	Program Elective – I	3	0	0	20	10	30	70	100	3
	Open Elective-I	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
PRACTICAL										
BET-C661	Embedded System Lab	0	0	2	10	5	15	35	50	1
BET-C662	Digital Signal Processing Lab	0	0	2	10	5	15	35	50	1
BCE-C657	JAVA Programming and Introduction of Python Lab	0	0	2	10	5	15	35	50	1
BET-C663	Seminar	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
TOTAL		15	0	8	140	70	210	490	700	19

Program Elective Subject List

BET-P610: Antenna and Wave Propagation
BET-P611: Power Electronics
BET-P612: Nano Electronics
BET-P613: Probability Random and Stochastic Process

Open Elective Subject List

BET-O630: Intellectual Property Rights
BEE-O631: Industrial Electrical systems
BEE-O632: Sensors and Transducers
BET-O633: Data Communication and Networks Protocols

(Effective from the academic session 2022-23)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Fourth Year (SEMESTER-VII)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VII

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BHU-S702	Industrial Economics and Business Administration	2	0	0	20	10	30	70	100	2
BET-C710	Microwave Theory and Technique	3	0	0	20	10	30	70	100	3
BET-C711	Wireless Communication	3	0	0	20	10	30	70	100	3
	Program Elective – II	3	0	0	20	10	30	70	100	3
	Open Elective – II	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								14
PRACTICAL										
BET-C761	Microwave Theory and Technique Lab	0	0	2	10	5	15	35	50	1
BET-C772	Minor Project	0	0	8	20	10	30	70	100	4
		TOTAL CREDITS								5
TOTAL		14	0	10	130	65	195	455	650	19

Program Elective Subject List

BCE-P730: Machine Learning-I
BET-P711: Fundamental of Radar and Navigation
BET-P712: Mixed Signal Design
BET-P713: Satellite Communication
BET-P714: Smart Antenna
BET-P715: Error Correcting Codes
BET-P716: Electromagnetic Metamaterials

Open Elective Subject List

BET-O710: Neural Network and Fuzzy Logic
BET-O711: Smart Sensors Technology
BEE-O730: Robotics Engineering
BEE-O731: Introduction to PLC and SCADA Systems

(Effective from the academic session 2022-23)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Fourth Year (SEMESTER-VIII)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VIII

DSC/SEC/ DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	TOTAL			
THEORY										
	MOOC- I	3	0	0	20	10	30	70	100	3
	MOOC- II	3	0	0	20	10	30	70	100	3
	MOOC- III	3	0	0	20	10	30	70	100	3
	MOOC- IV	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								12
PRACTICAL										
BET-C862	Major Project	0	0	16	0	100	100	300	400	8
		TOTAL CREDITS								8
TOTAL		12	0	16	80	140	220	580	800	20

List of MOOC courses shall be decided by the departmental committee in each semester depending upon the list from SWAYAM/NPTEL and other recognized online platforms. Students have to study from Online Platform doubt sessions shall be held by Internal teachers and exams shall be taken by university. If a student wishes he can give exam of Online Platform for certification. SWAYAM courses to run every year from July onwards (Odd Semester) are declared in the month of May and for courses to run every year from January onwards (Even Semester) are declared in the month of December on website https://swayam.gov.in/.

Notice: The SWAYAM course coordinator will ensure that the students are informed about MOOCs courses well before time. So that students get registered in the course decided by the departmental committee.

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – I YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
16 July 2019
(w.e.f. Batch 2019 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

(Effective from the academic session 2019-20)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-I

DSC/SEC/DSE/ AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM		
		L	T	P	CT	TA	Total	ESE		
THEORY										
BAP-C102	Engineering Physics	3	1	0	20	10	30	70	100	4
BEM-C102	Engineering. Mathematics– I	3	1	0	20	10	30	70	100	4
BET-C102	Electronic Devices	3	1	0	20	10	30	70	100	4
BEE-C102	Basic Electrical Engineering	3	1	0	20	10	30	70	100	4
		TOTAL CREDITS								16
BHU-S102	Vedic Science and Engineering	2	0	0	20	10	30	70	100	0
	Induction Program	for first three weeks								0
PRACTICAL										
BAP-C151	Engineering Physics Lab	0	0	2	10	5	15	35	50	1
BET-C151	Electronic Devices Lab	0	0	2	10	5	15	35	50	1
BEE-C151	Basic Electrical Engineering Lab	0	0	2	10	5	15	35	50	1
BME-C152	Workshop Practice	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
BSP-S151	Physical Training and Yoga	0	0	2	10	5	15	35	50	0
TOTAL		14	4	10	120	60	180	420	750	20

Effective from the session 2019-20

Mandatory Induction Program

Induction program for students to be offered right at the start of the first year. **(3 weeks duration)** and **credit:0**	
Activities carried out during three weeks induction program	• Physical activity • Creative Arts • Universal Human Values • Literary • Proficiency Modules • Lectures by Eminent People • Visits to local Areas • Familiarization to Dept./Branch & Innovations

Effective from the session 2019-20

BAP-C102
ENGINEERING PHYSICS

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Electronic materials: **(8 hours)**

Free electron theory of metals, quantum theory of free electrons, Fermi level, Density of states, Energy bands in solids, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level,

UNIT –II

Semiconductors: **(8 hours)**

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), concentration of charge carriers, Carrier generation and recombination, Carrier transport: diffusion and drift in p-n junction.

UNIT –III

Quantum Mechanics: (8 hours)

Introduction to quantum physics, black body radiation, explanation using the photon concept, photoelectric effect, Compton effect, de Broglie hypothesis, wave-particle duality, Born's interpretation of the wave function, verification of matter waves, uncertainty principle, Schrodinger wave equation & its solution for particle in box

UNIT –IV

Electrostatics : (8 hours)

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Farady's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images with simple examples , energy of a charge distribution and its expression in terms of electric field.

UNIT –V

Magnetostatics & LASERS: (8 hours)

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities. Einstein's theory of matter radiation interaction and A and B

coefficients; amplification of light by population inversion, different types of lasers: Ruby laser, He-Ne and CO2 laser, properties and applications of lasers.

References:

1.I.G. Main, Vibrations and Waves in Physics, Cambridge University Press (1993).
2. H. J. Pain, The Physics of Vibrations and waves, Wiley India Pvt., Ltd. 6th Edition (2010).
3. David Griffiths, Introduction to Electrodynamics, Pearson Education India Learning Private Ltd. 4th Edition (2015).
4. Halliday, Resnick, Walker, Fundamental of Physics, Wiley India Pvt. Ltd; 10th Edition (2015).
5.W. Saslow, Electricity, magnetism and light, Academic Press, 1th Edition (2002).
6. E. Hecht, Optics, Pearson Education, India, 4 th Edition (2008).
7. A. Ghatak, Optics, Tata McGraw-Hill Education India, 5 th Edition (2012).
8. O. Svelto, Principles of Lasers, Springer Science & Business Media (2010).
9. D.J. Griffiths, Quantum Mechanics, Pearson Education (2014).
10. R. Robinett, Quantum Mechanics, OUP Oxford (2006).
11. L.I. Schiff, Quantum Mechanics, Tata McGraw-Hill Education Pvt. Ltd, 4th Edition (2014)
12. D.A. Neamen, Semiconductor Physics and Devices, Times Mirror High Education Group, Chicago (1997).
13. E.S. Yang, Microelectronic Devices, McGraw Hill, Singapore (1998).
14. B. G. Streetman, Solid State Electronic Devices, Prentice Hall of India (1995).
15. K. Charles, Introduction to Solid State Physics, John Wiley, Singapore, 7th Edition (1996).

Course Outcomes:

- After successful completion of the course, the students should be able to

Understand the basic knowledge about oscillations and waves, laser, quantum mechanics and its role in semi-conductor materials

- Know the conceptual physics and its use in solving the physical problems. Apply the principles of physics.
- Describe the physics in his/ her words.
- Identify the reasons for physical happenings.

Effective from the session 2019-20

BEM-C102
ENGINEERING MATHEMATICS I

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Differential Calculus I : Successive differentiation, Leibnitz theorem, Taylor's & Maclaurin's Expansion, Indeterminate forms, Radius of curvature, Asymptotes, Double points and their classification, Tracing of curves.

UNIT II

Differential Calculus II : Partial Differentiation of functions, Normal to surfaces and tangent plane, Change of variables, Jacobian, Taylor's series of two variables, Truncation errors, Extrema of function of two and more variables, Method of Lagrange's multipliers.

UNIT III

Multiple Integrals : Fundamental Theorem of integral calculus, Differentiation under the integral sign, Double and triple integrals, Change of order of integration, change of variables. Application to arc length, area , volume, centroid and moment of inertia. Gamma and Beta functions, Dirichlet's integral.

UNIT IV

Vector Calculus : Differentiation of a vector, Scalar and vector fields, Gradient, Divergence, Curl and their physical meanings, Differential operator and identities, Line, Surface and Volume integrals, Green's theorem in plane. Gauss and Stoke's theorems (without proof). Simple applications.

UNIT V

Matrices : Elementary row/ column operations, Rank of a matrix and its applications, Eigen-values and Eign vectors, Cayley-Hamilton theorem, Diagonalisation of Matrices, Linear dependence and independence, Normal matrices, Complex matrices and unitary matrices.

References

1. Prasad C., A first course in mathematics for Engineers, Prasad Mudranalaya
2. Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
3. Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
4. Srivastava R.S.L., Engineering Mathematics Vol.I

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and matrices. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

- To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- To deal with functions of several variables that are essential in most branches of engineering.
- The essential tool of matrices and vector calculus in a comprehensive manner.

Effective from the session 2019-20
BET-C102/BET-C202
ELECTRONIC DEVICES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Semiconductors, energy band description of semiconductors, effect of temperature on semiconductors, intrinsic and extrinsic semiconductors, donor and acceptor impurities, electron and hole concentration, conductivity of a semiconductor, mobility and resistivity, Generation and Recombination, Hall effect, Fermi level, mass action law, charge densities in a semiconductor, diffusion and Poisson and continuity equation.

.

UNIT II

P-N junction and its properties, V-I characteristics of P-N junction, application of junction diode as clippers, clampers and rectifiers (Half-wave, Full-wave and bridge), Zener and avalanche breakdown mechanism, Zener diode and its characteristics, equivalent circuit of Zener diode, Zener diode as a voltage regulator, LED, photo diode and solar cell.

UNIT III

Bipolar junction transistor(BJT) and its action, Transistor configurations (CB, CE and CC) and their characteristics, cut-off, active and saturation regions. Transistor as a switch, operating point, dc load line, Transistor biasing and its necessity, thermal runaway, types of biasing and their analysis, stability factors, Transistor as a regulator. Concept of Transistor amplifier, graphical analysis of CE amplifier, dc and ac equivalent circuits, Emitter follower and its ac model.

UNIT IV

Ebers-Moll model of BJT, T model of BJT, Hybrid model of BJT at low frequency, computation of voltage gain, current gain and power gain, Zi and Zo and approximate formulas, high frequency transistor hybrid π model.

UNIT V

Field Effect Transistor: JFET and its characteristics, configurations of JFET, MOSFET, FET biasing, Fixed-bias configuration, Self-bias configuration, Voltage-Divider biasing, MESFET (Enhancement & depletion types) their construction and characteristics, configuration of MOSFET, MOS capacitor.

References

1. Integrated Electronics: Jacob Millman & C.C. Halkias
2. Malvino and leach “Digital principle and applications.
3. Streetman Ben.G, “Solid state electronic devices” (3/e), PHI
4. Millman and grabel, “Microelectronics” PHI
5. Robert Bolyestad “Electronic devices and circuit”, PHI

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the principles of semiconductor Physics
2. Understand and utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

Effective from the session 2019-20

BEE-C102/BEE-C202
BASIC ELECTRICAL ENGINEERING

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

D.C. Network Theory: Concept of elements**,** Circuit theory concepts- Mesh and node analysis, Star-Delta transformation. Network Theorems- Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, DC Transients- RL, RC circuits.

UNIT II

Steady State Analysis of A.C. Circuits: Sinusoidal and Phasor representation of voltage and current, average and rms value, form and peak factor of sinusoidal and different waveforms, single -phase A.C. circuit- behavior of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor.
Three Phase A.C. Circuits: Star-Delta connections, line and phase voltage/current relations, three -phase power and its measurement.

UNIT III

Magnetic Circuits: Ampere turns, magnetomotive force, permeability, reluctance, composite magnetic circuits, comparison between magnetic and electric circuits.
Transformer: Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single-phase transformer, O.C. and S.C. tests.

UNIT IV

D. C. Machines : Principle of electromechanical energy conversion, types of D.C. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, speed control of D.C. motors and applications.
Measuring Instruments: Principle of working and constructional features of Permanent Magnet Moving Coil and Moving Iron ammeters and voltmeters, Electrodynamic Wattmeter, Induction type single-phase Energy meter.

UNIT V

Three-phase Induction Motor: Principle of operation, types and methods of starting, slip-torque characteristics and applications.
Single-phase Induction Motor: Principle of operation, methods of starting.
Three-phase Synchronous Machines: Principle of operation and application of synchronous motor.

References

1. V. Del Toro, Principles of Electrical Engineering, Prentice Hall International.

2. H. Cotton, Advanced Electrical Technology, Wheeler Publishing.
3. E. Huges, Electrical Technology.
4. B. L., Theraja, Electrical Technology, Vol-1, S. Chand Publisher, New Delhi.
5. W.H. Hayt & J.E. Kennedy, Engineering circuit Analysis, Mc Graw Hill.
6. I.J. Nagrath, Basic Electrical Engineering, Tata Mc Graw Hill.
7. A.E. Fitgerald, D.E., Higginbotham and A Grabel, Basic Electrical Engineering, Mc Graw Hill.
8. Ashfaq Hussain, Fundamentals of Electrical Engineering, Dhanpat Rai Publish.

Effective from the session 2019-20

BHU-S102/BHU-S202
VEDIC SCIENCE & ENGINEERING

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 0**
2 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Science in Vedic literature and Indian Philosophy-I : Kanad's atomic theory, concept of parmanu, Formation of molecules, Parimandal, Comparison with modern atomic theory. Concept of SAMATA and VISHAMTA vs Maxwell-Boltzmann's distribution of velocities and energies. Maharshi Kanad's law of motion and law of gravitation.

UNIT II

Science in Vedic literature and Indian Philosophy-II : First and Second Law of thermodynamics in daily life. Law of helplessness of mankind in thermodynamics and Indian philosophy. Entopy in life and concept of pralaya. Dhananjay Vs concept of Radioactivity-life after death. Atomic spectrum Vs concept of Kundalini.

UNIT III

Vedic Mathematics : Measurements in Vedic Times, ancient scale of length, mass, time and temperature, Number system, Geometry according to sulba Sutra. Overview of Vedic Mathematical Rules (ekadhiken pooren, Nikhil navtascharaman dashatah, oordhavatriyagyabhyam)

UNIT IV

Electrical, Electronics & Aeronautical Engineering in Vedas : Concept of electrical Engineering, type of electricity – Tadit, Saudamini, Vidyut, Shatakoti, Haradini, Ashani. Electronics Engineering in Vedic literature. Aeronautical Engineering in Vedic literature, Types of Vimanas and their construction and working, Shakun viman, Rukma viman, Tripura viman.

UNIT V

Mechanical, Chemical, Civil & Architectural engineering in Vedic Literature : Mechanical & Chemical Engineeering in ancient India. Civil and Architectural engineering in Vedic literature.

References

1. Science in Vedas by Acharya Vaidyanath Sashtri.
2. Science in the Vedas by Hansraj, Shakti Publications, Ludhiana.
3. Vedic Mathematics by Swamisri Bharati Krishana Teerathaji, Motilal Banarasi Das, Delhi.

4. Brahad Viman shastra by Maharishi Bhardwaj.
5. Vymanika shastra, English translation by G. R. Josyer.
6. Alchemy and Metallic Medicines in Ayurveda by : Vaidya Bhagwan Das.
7. History of Hindu Chemistry by : P. C. Raya
8. Indian Alchemy by : Dr. S. Mahdihassan.
9. Ancient Scientist of Indian by Satya Prakash.
10. Vaishaishik Darshan by Maharishi Kanad.
11. Vedas : The sources of ultimate science by S. R. Verma, Nag Publisher, New Delhi.

Effective from the session 2019-20

BAP-C151/BAP-C251
ENGINEERING PHYSICS LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS

1. To verify the inverse square law of radiation using Photoelectric effect.
2. To determine the value of Planck's constant and photoelectric work function of the material of the cathode using Photoelectric cell.
3. To determine the frequency of an unknown signal by the drawing the Lissajous patterns for various frequency ratios and evaluate the phase difference between two sinusoidal signals applied to X and Y inputs of cathode ray oscilloscope.
4. To determine the value of e/m of an electron by helical method / Thomson method.
5. To verify the existence of Bohr's energy level with Frank-Hertz apparatus.
6. To determine the resistivity and energy band gap by Four Probe method.
7. To determine the Curie temperature of the given Ferrite material.
8. To find the refractive index of the material of given Prism using Spectrometer.
9. To determine the wavelength of He-Ne laser by Diffraction Method.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Course Outcomes:

- After Successful completion of the applied physics laboratory course, student should be able to:
- verify the theoretical formulations/ concept of physics.
- know the art of recording the observations of an experiment scientifically.
- learn by doing.
- handle and operate the various elements/ parts of experiments.
- understand the importance of experiments in engineering & technology.

Effective from the session 2019-20

BEE-C151/BEE-C251
BASIC ELECTRICAL ENGINEERING LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS

1. Verification of Kirchoff's laws.
2. Verification of Thevenin's theorems.
3. Verification of Norton's theorem
4. Verification of Superposition theorem.
5. Verification of maximum power transfer theorem.
6. Measurement of power in three-phase circuit by two wattmeter method.
7. Determination of efficiency of a single-phase transformer by load test.
8. To perform open circuit test on single-phase transformer & find equivalent circuit parameters.
9. To perform short circuit test on single-phase transformer & find equivalent circuit parameters.
10. D.C. generator characteristics
    (a) Shunt generator
    (b) Series generator
    (c) Compound generator
11. Speed control of D.C. shunt generator.
12. To study running and reversing of a three-phase Induction Motor.
13. To study & calibration of a single-phase Energy Meter.
14. Calibration of voltmeter and ammeter.
15. To study of resonance in RLC circuit.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2019-20

BET-C151/BET-C251
ELECTRONICS DEVICES LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS

1. To draw the V-I characteristics of PN junction diode.
2. To draw the V-I characteristics of Zener diode and study it as voltage regulator.
3. To study junction diode as half wave and full wave rectifier.
4. To study junction diode as clipper and clamper.
5. To draw the input and output characteristics of a transistor in CE and CB configuration.
6. To find the small signal h-parameters of a transistor.
7. To draw the input and output characteristics of FET and to measure the pinch off voltage.
8. To draw the drain and transfer characteristic curve of MOSFET.
9. To draw the frequency response of FET amplifier.
10. To draw the frequency response curve of Emitter Follower.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2019-20

BME-C152/BME-C252
WORKSHOP PRACTICE

MM: 50 **Sessional: 15**
Time: 2 hrs. **ESE: 35**
L T P **Credit: 1**
0 0 2

LIST OF EXPERIMENTS

Carpentry Shop
1. Study of Carpentry Tools, Equipment and different joints.
2. To prepare a half T joint of given dimensions.

Moulding Shop
3. Introduction to Patterns, pattern allowances, Gate, Riser, and Runner.
4. To prepare a mould of half bearing.

Metal Joining.
5. To prepare a butt joint of MS strips using Arc welding.
6. To prepare a T joint of MS strips using Oxy Acetylene gas welding.

Fitting Shop
7. To prepare a rectangular piece with slant edge of given size from M.S. flat.

Machine Shop
8. To prepare a job on Lathe machine of given shape and size.
9. To prepare a job on Shaper machine of given shape and size.
10. To prepare a job on Milling machine of given shape and size.
11. To prepare a job on CNC train master of given shape and size.
12. To prepare a job on drilling machine of given shape and size.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2019-20

BSP-S151
Physical training and Yoga

MM: 50 **Sessional: 15**
L T P **ESE: 35**
0 0 2 **Credit: 0**

UNIT 1

1. Warming up (meaning, types and methods)
2. Components of physical fitness (strength, endurance, speed, flexibility and agility)
3. Methods of improving strength
4. Methods of improving endurance
5. Methods of improving speed
6. Methods of improving flexibility
7. Limbering down/ cooling down

UNIT 2

1. Yama
2. Niyama
3. Asana and Pranayama
4. Shatkarma and Mudra
5. Dharana and Dhyana
6. Meditation and Samadhi

(Effective from the academic session 2019-20)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. First Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-II

DSC/SEC/DSE /AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BAC-C202	Engineering Chemistry	3	1	0	20	10	30	70	100	4
BEM-C202	Engineering Mathematics – II	3	1	0	20	10	30	70	100	4
BCE-C202	Programming for Problem Solving	3	1	0	20	10	30	70	100	4
BME-C203	Basic Mechanical Engineering	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
BEN-A203	Environmental Studies	2	0	0	20	10	30	70	100	0
PRACTICAL										
BAC-C251	Engineering Chemistry Lab	0	0	2	10	5	15	35	50	1
BCE-C251	Programming for Problem Solving Lab	0	0	2	10	5	15	35	50	1
BME-C253	Engineering Graphics and Design Lab	1	0	2	10	5	15	35	50	2
BEG-A251	Technical Communication Lab	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								5
TOTAL		15	3	8	120	60	180	420	700	20

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after II semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in III semester. Also the students have to present PPT of the industrial training/mini project/internship for presentation in the department.

Effective from the session 2019-20

BAC-C102/BAC-C202
ENGINEERING CHEMISTRY

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Unit I

Atomic and molecular structure (8 hours)

Schrodinger equation, basic concepts of quantum numbers. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Unit II

Spectroscopic techniques and applications (8 hours)

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.

Unit III

Periodic properties (4 hours)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

Intermolecular forces and potential energy surfaces (4 hours)

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

Unit IV

Use of free energy in chemical equilibria (8hours)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Use of free energy considerations in metallurgy through Ellingham diagrams.

Unit V

Nanomaterials and Introduction to carbon nanotubes (theoretical aspects only) (4 hours)

References

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3. Fundamentals of Engineering Chemistry (NPTEL Web-book), by B. L. Tembe,Kamaluddin and M. S. Krishnan
4. Physical Chemistry, by P. W. Atkins
5. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5thEdition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.
Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
Rationalise bulk properties and processes using thermodynamic considerations.
Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
List major chemical reactions that are used in the synthesis of molecules.

Effective from the session 2019-20

BEM-C202
ENGINEERING MATHEMATICS II

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Differential Equation : Ordinary differential equations of first order, orthogonal trajectories, linear differential equations with constant coefficients, Euler- Cauchy equations, Equations of the form $y'' = f(y)$. Solution of second order differential equations by change of dependent and independent variables, Method of variation of parameters for second order differential equations. Simple applications.

UNIT II

Partial Differential Equations and its Applications : Introduction of partial differential equations, Linear partial differential equations of II order with constant coefficients and their classifications - parabolic, elliptic and hyperbolic with illustrative examples, Method of separation of variables. Wave and Heat equation up to two-dimensions.

UNIT III

Solution in Series : solution in series of second order linear differential equations, Bessel's and Legendre's equations and their solutions, Properties of Bessel function and Legendre's polynomials, Recurrence relations, Generating functions, Jacobi series, Integral representation of Bessel's functions.

UNIT IV

Fourier Series : Fourier series, Dirichlet's condition and convergence. Half range series, Harmonic analysis.

UNIT V

Statistics : Moments, Moment generating functions. Binomial, Poisson and Normal distributions. Correlation and Regression. Method of least squares and curve fitting - straight line and parabola.

References

1. Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
2. Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999
3. Prasad C.,Advanced Mathematics for Engineers, Prasad Mudranalaya
4. Kapur J. N. & Saxena H.C., Mathematical Statistic.

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in differential equations, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

- The mathematical tools needed in evaluating differential equations and their usage.
- The effective mathematical tools for the solutions of partial differential equations that model physical processes.
- The tool of Bessel function and Fourier series for learning advanced Engineering Mathematics.
- The basic ideas of statistics including measures of central tendency, correlation and regression.

Effective from the session 2019-20

BCE-C102/BCE-C202
PROGRAMMING FOR PROBLEM SOLVING

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction to Computers: Block diagram of computers, functions of its important components, Memory and I/O devices. Concept of assembler, interpreter, compiler & generation of languages.

Number System: Decimal, Binary, Octal, and Hexadecimal numbers and their arithmetic (addition, subtraction, multiplication, and division): 1's and 2's complements

UNIT II

Programming in C: History, Introduction to C Programming Languages, Structure of C Programs, Compilation and Execution of C Programs, Debugging techniques, Data Type and sizes, Declarations of variables, Modifiers, Identifiers and keywords, Symbolic Constants, Storage classes(automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.

Operators: Unary operators, Arithmetic & Logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation.

Control Statements: If-else, switch, break, continue, the coma operator, goto statement. **Loops:** while, do-while, for loop.

UNIT III

Arrays: One-dimensional arrays: declaration, initialization and application. Two-dimensional array: declaration, initialization and application, Multidimensional arrays.

Handling of Character Strings: Declaring and initializing string variables, Reading strings, Writing strings, Arithmetic operation on strings, comparison of two strings and string handling functions.

Pointers: Accessing the address of the variable, Declaring and initializing pointers, accessing a variable through its pointer expression, pointer increment and scale factor, pointers and array, pointers and character strings.

UNIT IV

Functions: Need for user defined function, Return value and its type, function calls, No argument and No return values function, Argument and No return values functions, argument and return value functions. Handling of non integer function, Scope and life time of variable in functions.
Recursion: Recursive Definition and processes, recursion in C, example of recursion, Tower oh Hanoi Problem, simulating recursion, Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

UNIT V

Structures: Structures definition, giving value to members, structure initialization, array of structures, array within structures, structures within structures, structures and functions, Structure Pointrers.
File Handling: Creating and Deleting a File, Updating File, Copying File, Searching & Sorting in a File.

References:

1. Rajaraman V.(3/e), Fundamental of Computers, PHI, New Delhi, 1999
2. Sanders,D.H., Computers Today, Mcgraw Hill, 1998
3. Kris Jamsa, DOS the complete reference, Tata McGraw Hill
4. J.Peek Tim O'reilly & M.Locekides, UNIX POWER TOOLS, BPB Publication
5. Yashwant Kanetkar, Let Us C, BPB
6. Yashwant Kanetkar, C In Depth, BPB

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Effective from the session 2019-20

BME-C203
BASIC MECHANICAL ENGINEERING

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Thermodynamics I: Introduction to SI units, Definition of thermodynamic system, Surrounding and Universe, Quasi static process, Energy interaction Zeroth law, Concept of temperature First law of thermodynamics, Application to closed and open system, Concept of Enthalpy, steady flow energy equation, Throttling process.

UNIT II

Thermodynamics II: Second law, reversible and irreversible process, Thermal reservoir, heat engines and thermal efficiency, COP of heat pump and refrigerator, Carnot cycle, Claudius inequality, Concept of entropy, Entropy change for ideal gases**.**

UNIT III

Thermodynamics III: Generation of steam at constant pressure, Properties of steam, Use of property diagram, Process of vapor in closed and open system, Rankine cycle. Stroke clearance ratio, Compression ratio, Definition and calculation of mean effective pressure (no proof) for air standard cycles (Otto and diesel cycles

UNIT IV

Mechanics: Trusses: Plane structure, (Method of Joints and Sections only) Beams: Bending moment and shear force diagram for statically determinate beams.

UNIT V

Strength of Materials: Simple stresses and strain, strain energy, stress- strain diagram, elastic constants. Compound stress and strain: state of stress at a point, Simple tension, pure shear, general two dimensional stress system, principal planes, principal stresses and strains, Mohr's stress circle, Poisson's ratio, maximum shear stress

References

1 Kumar DS (2/e), Thermal Science and Engineering, S.K.Kataria, New Delhi,2001
2 P.K.Nag (2/e), Engineering Thermodynamics, TMH, New Delhi,2001
3 R.Yadav(7/e), Thermal Engineering, Central Publishing House, Allahabad, 2000
4 Shames Irving H.(4/e), Engineering Mechanics, PHI, New Delhi, 1994
5 Hibler (1/e), Statics and Dynamics, Pearson Education, Singapore, 2000

Effective from the session 2019-20

BEN-A203
ENVIRONMENTAL STUDIES

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 0**
2 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Multidisciplinary Nature of Environmental Studies & Ecosystems: (a) definition, scope and importance of ecology and environment (b) ecological components: (i) abiotic components: soil, water, light and temperature (ii) biotic components & their relationships- symbiosis, commensalisms, parasitism, predation and antibiosis (c) concept of an ecosystem (d) structure and function of an ecosystem (e) producers, consumers and decomposers (f) energy flow in the ecosystem (g) ecological succession (h) food chains, food webs and ecological pyramids (i) introduction, types, characteristic features, structure and function of the following ecosystems: (i) forest ecosystem (ii) grassland ecosystem (iii) desert ecosystem (iv) aquatic ecosystems (pond, river, ocean) (j) Need for public awareness

UNIT II

Natural Resources: (a) forest resources: use and over-exploitation, deforestation, timber extraction, mining; dams and their effects on forest and tribal people (b) water resources: use and over-utilization of surface and ground water, benefits and problems of dams (c) mineral resources: use and exploitation, environmental effects of extracting and using mineral resources (d) energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources (e) land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification (f) biodiversity & its conservation: definition- genetic, species and ecosystem diversity, values of biodiversity- consumptive use, productive use, social, ethical, aesthetic and option values (g) India as a mega-diversity nation, hot-spots of biodiversity, threats to biodiversity- habitat loss, poaching of wildlife, man-wildlife conflicts; endangered and endemic species of India, conservation of biodiversity: *in-situ* & *ex-situ* methods (h) bio-geographical classification of India (i) role of an individual in conservation of natural resources (j) equitable use of resources for sustainable lifestyles

UNIT III

Environmental Pollution: (a) Definition, causes, effects and control measures of: air pollution, water pollution, soil pollution, noise pollution, thermal pollution and nuclear hazards (b) solid waste management- causes, effects and control measures of urban and industrial wastes (c) role of an individual in prevention of pollution (d) disaster management: floods, earthquake, drought & landslides

UNIT IV

Social Issues and the Environment: (a) from unsustainable to sustainable development (b) urban problems related to energy (c) rain water harvesting (d) resettlement & rehabilitation of people-problems and concerns (e) environmental ethics- issues and possible solutions (f) wasteland reclamation (g) population growth and family welfare programme (h) environment and human health, human rights, value education (i) HIV/AIDS (j) role of information technology (IT) in environment and human health (k) global environmental issues: global warming, acid rain, ozone layer depletion

UNIT V

Environmental policies and laws: (a) salient features of following acts i. Environment Protection Act 1986 ii. Air (Prevention and Control of Pollution) Act 1981 iii. Water (Prevention and Control of Pollution) Act 1974 iv. Wildlife Protection Act 1972 v. Forest Conservation Act 1980 (b) issues involved in enforcement of environmental legislation (c) public awareness

References

1. Agarwal, K.C. *Environmental Biology*, Nidhi Publ. Ltd., Bikaner.
2. Bharucha E. *The Biodiversity of India*, Mapin Publishing Pvt. Ltd., Ahmedabad.
3. Clark R.S. *Marine Pollution*, Clanderson Press Oxford.
4. Cunningham, W.P., Cooper, T.H., Gorhani, E. & Hepworth, M.T. *Environmental Encyclopedia*, Jaico Publ. House, Mumabai.
5. De A.K. *Environmental Chemistry*, Wiley Eastern Ltd.
6. Gleick, H.P. *Water in Crisis*, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press.
7. Hawkins R.E. *Encyclopedia of Indian Natural History*, Bombay Natural History Society, Bombay.
8. Heywood, V.H & Waston, R.T. *Global Biodiversity Assessment*, Cambridge Univ. Press.
9. Odum, E.P. *Fundamentals of Ecology*, W.B. Saunders Co. USA.
10. Rao M N. & Datta, A.K. *Waste water treatment*, Oxford & IBH Publ. Co. Pvt. Ltd.
11. Sharma B.K. *Environmental Chemistry*, Geol Publ. House, Meerut.
12. Trivedi R.K. *Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards*, Vol. I and II, Enviro Media.
13. Trivedi R. K. and Goel, P. K. *Introduction to air pollution*, Techno-Science Publication.
14. Wanger K.D. *Environmental Management*, W.B. Saunders Co. Philadelphia, USA.

Effective from the session 2019-20

BAC-C151/BAC-C251
ENGINEERING CHEMISTRY LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS
Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity.
2. Thin layer chromatography.
3. Ascending paper chromatography.
4. Ion exchange column for removal of hardness of water.
5. Determination of turbidity of unknown sample by using turbiditimeter in the range of 0-10 NTU.
6. Determination of chloride content of water.
7. Colligative properties using freezing point depression.
8. Determination of the rate constant of a reaction.
9. Determination of cell constant and conductance of solutions.
10. Potentiometry - determination of redox potentials and emfs.
11. Synthesis of a polymer/drug.
12. Saponification/acid value of an oil.
13. Chemical analysis of a salt (mixture of one acid and one base).
14. Titration between potassium permanganate and ferrous ammonium sulphate solutions.
15. Lattice structures and packing of spheres.
16. Models of potential energy surfaces.
17. Chemical oscillations- Iodine clock reaction.
18. Determination of the partition coefficient of a substance between two immiscible liquids
19. Adsorption of acetic acid by charcoal.
20. Use of the capillary viscometers to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

Laboratory Outcomes
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
Estimate rate constants of reactions from concentration of reactants/products as a function of time
Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
Synthesize a small drug molecule and analyze a salt sample.

NOTE

1. In practical examination the student shall be required to perform two experiments.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2019-20

BCE-C151/BCE-C251
PROGRAMMING FOR PROBLEM SOLVING LAB

MM :50
Time : 2 hrs
L T P
0 0 2

Sessional: 15
ESE: 35
Credit : 1

LIST OF EXPERIMENTS

1. Practice of all internal and external DOS commands.
2. Write simple batch program.
3. Giving exposure to windows environment.
4. File and program management in windows.
5. Practice of all UNIX commands.
6. Introduction to text editing and word processing.
7. Net surfing.
8. Creation and usage of E-mail account.
9. Write a program in C to perform different arithmetic operations.
10. Write a program in C to greater of two numbers.
11. Write a program in C to check whether no. is odd or even.
12. Write a program in C to check whether no. is prime or not.
13. Write a program in C to print Fibonacci series.
14. Write a program in C to print factorial of a no.
15. Write a program in C to add two matrices.
16. Write a program in C to search a no. in array.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2019-20

BME-C253
ENGINEERING GRAPHIC AND DESIGN LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 2**
1 0 2

Unit 1: Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering and dimensioning, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, and Hypocycloid Scales – Plain, Diagonal and Vernier Scales;

Unit 2: Orthographic Projections and Projections of Regular solids
Principles of Orthographic Projections-Conventions – Principal planes, Auxiliary Planes, Introduction to first angle and third angle projection, Projections of Points, projection of lines- parallel to both the planes, parallel to one and inclined to other, inclined to both the planes, true length and traces of a line, and lines inclined to both planes, Projections of planes, traces of planes, angles of inclinations of planes, parallel planes.

Unit 3: Sections and Sectional Views of Right Angular Solids and Isometric Projections
Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)
Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

Unit 4: Overview of Computer Graphics Customization and CAD Drawing
Computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software (AUTOCAD) [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in AUTOCAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids.

Unit 5: AUTOCAD as a tool for design and drawing objects

Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); orthographic projection techniques; Drawing sectional views of composite right regular geometric solids CAD software(AUTOCAD) modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multiview, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques;

dimensioning and scale multi views of dwelling. Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Appling Colour coding according to building drawing practices; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

References

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & Pannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software.

This course is designed to address:

- To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice
-

The student will learn :

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling and computer-aided geometric design
- Exposure to creating working drawings and engineering communication

Effective from the session 2019-20
BEG-A251
TECHNICAL COMMUNICATION LAB

MM :50 **Sessional: 15**
Time : 2 hrs **ESE: 35**
L T P **Credit : 1**
0 0 2

Experiments related to the following:

Objectives:
1. To expose the learners to English sound system and acquire phonetic skill and speech rhythm.
2. To help the learners use grammar correctly.
3. To train the learners to speak English, clearly, intelligibility and effectively.
4. To equip the learners to compete for a career, and enable them to function effectively in careers which demand good communication skills.

Contents:
i) Non - verbal communication
- Use of hands
- Posture of shoulders
- Eye contact
- Weight of the body
- Movement of the body

ii) Applied Phonetics
- Sound of English-consonants and Vowels
- Phonemic Transcription
- Stress, Rhythm and Intonation

Remedial Grammar
- Some useful expression (introduction, greetings etc.) that are used frequently.
- Common mistakes in the use of nouns, pronouns, adjectives, adverb, prepositions and conjunctions.
- Use of who and whome, much and many, still and yet, so as and so that, make and do.
- Tense and their use.
- Confusion of participles.
- Tag Questions

Reading and Speaking skills, Listening and Writing skills
- Presentation and addresses
- Group discussion
- Interviews
- Role playing

Reading and Writing skills, Listening and Writing skills

- Letter writing-formal and informal
- Real life social situations
- Curriculum vitae
- Agenda, notice and minutes

References

1). T. Balsubramaniam. “Phonetics for Indian students”, Macmillan India Ltd.
2). Jones, Daniel. “English Pronouncing Dictionary”, Cambridge Univ. Press.
3). Oxford Advanced Learners Dictionary.
4). Taylor, Grant. “Conversation Practice”, TMH, New Delhi.
5). F.T.A. Wood. “Remedial English Grammar”, Macmillan India Ltd.
6). Berry, Thomas Elliot. “The most common errors in English usage”, TMH, New Delhi.
7). N. Krishnaswamy. “Modern English”, Macmillan India Ltd.
8). Desmond. “People Watching”.

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – II YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
16 July 2019
(w.e.f. Batch 2019 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

(Effective from the academic session 2020-21)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-III

DSC/SEC/ DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BEM-C302	Engineering Mathematics- III	3	1	0	20	10	30	70	100	4
BET-C305	Analog Communication	3	0	0	20	10	30	70	100	3
BCE-C305	Data Structure-I	3	0	0	20	10	30	70	100	3
BCE-C306 CSE/EC	Computer Architecture and Organization	3	0	0	20	10	30	70	100	3
BET-C306	Digital System Design	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								16
PRACTICAL										
BET-C354	Analog Communication Lab	0	0	2	10	5	15	35	50	1
BCE-C355	Data Structure-I Lab	0	0	2	10	5	15	35	50	1
BET-C355	Digital System Design Lab	0	0	2	10	5	15	35	50	1
BET-S359	Summer Training and Internship Program-I/mini project (3-4 weeks)	To be pursued during summer vacation, submit a certificate of completion in the department (in summer break after II semester exam and will be assessed during III semester)							50	1
		TOTAL CREDITS								4
TOTAL		15	1	6	130	65	195	455	700	20

Effective from the session 2020-21
BEM-C302
ENGINEERING MATHEMATICS- III

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 4**
3 1 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Laplace Transform: Laplace transform of elementary functions. Shifting theorems. Transform of derivatives. Differentiation and Integration of transforms. Heaviside unit step and Dirac Delta functions. Convolution theorem. Solution of ordinary linear differential equations used in Mechanics, Electric circuits and Bending of beams.

UNIT II

Fourier Transforms : Definition of Fourier transform, Fourier sine and cosine transforms. Fourier integral formula. Applications to solutions of boundry value problems.

UNIT III

Z - transform : Definition, Linearity property, Z - transform of elementary functions, Shifting theorems, Initial and final value theorem, Convolution theorem, Inversion of Z - transforms, Solution of difference equations by Z - transforms.

UNIT IV

Functions of a Complex Variable - I : Analytic functions, C-R equations and harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions, Liouville's theorem.

UNIT V

Functions of a Complex Variable - II : Representation of a function by power series, Taylor's and Laurent's series, Singularities, zeroes and poles, Residue theorem, evaluation of real integrals of type $\int_{o}^{2\pi} f(\cos\theta, \sin\theta)d\theta$ and $\int_{-\infty}^{\infty} f(x)/F(x)dx$, Conformal mapping and bilinear transformations.

References

1. Prasad C., Advanced mathematics for Engineers, Prasad Mudranalaya
2. Schaum outline Series, Integral Transform,TMH
3. Grewal B.S., Higher Engineering Mathematics, Khanna, New Delhi, 2000
4. Brancewel, Fourier Transforms and their applications, McGraw
5. Kreyszig E., Advanced Engineering Mathematics, John Wiley, New York, 1999

Course Outcomes

The objective of this course is to familiarize the prospective engineers with techniques in Laplace transform, Fourier transform, Z- transform and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of different transform that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

Effective from the session 2020-21
BCE-C305
DATA STRUCTURE – I

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

.

UNIT I

Structures: Structures definition, giving value to members, structure initialization, array of structures, array within structures, structures within structures, structures and functions,Structure Pointrers.
File Handling: Creating and Deleting a File, Updating File, Copying File, Searching & Sorting in a File.
Complexity: Algorithm Complexity and Time-Space trade-off.

UNIT II

Stack: Array representation and Implementation of stack, Operations on stack: Push & Pop, Array representation of Stack, Linked representation of Stack, Operation associated with stacks, Application on stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of Postfix expression using stack.
Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque and Priority Queue.

UNIT III

Linked List: Representation and Implementation of Singly Linked List, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and Deletion to/from Linked List, Insertion and Deletion Algorithms, Doubly linked List, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

UNIT IV

Trees: Basic terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked representation of Binary trees, Traversing Binary trees.
Binary Search Tree: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of search algorithm, Path Length, AVL Tree, B-trees.

UNIT V

Searching and Hashing: Sequential Search, Comparison and Analysis, Hash table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.
Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.
File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

References

1. Horowitz and Sahani, Fundamentals of Data Structure, Galgotia.
2. R.Kruse etal, Data Structures and Program Design in C, Pearson Education.
3. A M Tenenbaum etal, Data Structure using C & C++, PHI.
4. Lipschutz, Data Structure, TMH.
5. K. Loudon, Mastering Algorithms with C, Sheoff Publisher & Distributors.
6. Bruno R Preiss, Data Structures and Algorithms with Object Oriented Design Pattern in C++, John Wiley & Sons, Inc.
7. Yashwant Kanetkar, Pointers in C, BPB

Course outcomes

1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.
4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.
5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

Effective from the session 2020-21
BCE-C306
COMPUTER ARCHITECHURE AND ORGANIZATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro-operation, Arithmetic Logic Shift Unit, Arithmetic Algorithms (addition, subtraction, Booth's Multiplication), IEEE standard for Floating point numbers.

UNIT II

Control Design: Hardwired & Micro Programmed Control Unit, Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction.

UNIT III

Processor Design: Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).

UNIT IV

Input-Output Organization: I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

UNIT V

Memory Organization: Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

References

1. M. Mano, Computer System Architecture, PHI
2. Vravice, Zaky & Hamacher, Computer Organization, TMH Publication
3. Tannenbaum, Structured Computer Organization, PHI
4. Stallings, Computer Organization, PHI
5. John P.Hayes, Computer Organization, McGraw Hill

Course outcomes

1. Draw the functional block diagram of a single bus **architecture of a computer and describe the function of the** instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set.
2. **Write** assembly language program for specified microprocessor for computing 16 bit multiplication, division and I/O device interface (ADC, Control circuit, serial port communication).
3. Write a flowchart for Concurrent access to memory and cache coherency in **Parallel Processors** and describe the process.
4. Given a CPU organization and instruction, design a memory module and analyze its operation by interfacing with the CPU.
5. Given a CPU organization, assess its performance, and apply design techniques to enhance performance using pipelining, parallelism and RISC methodology

Effective from the session 2020-21
BET-C305
ANALOG COMMUNICATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Signals and its Representation: Review of Fourier transform, Signal transmission through linear system, Signal distortion in transmission, Time domain versus Frequency Domain, Application of Delta function in Fourier Transform calculations Fourier transform of periodic signals.

UNIT II

Linear Modulation, Amplitude modulation, generation and demodulation of AM, Wave, suppressed carrier modulation, DSB-SC modulation, and its generation and demodulation, SSB-SC modulation, Exponential modulation, modulation F.M. waves, generation of F.M. waves, De-emphasis and Pre-emphasis filtering.

UNIT III

A.M. and F.M. transmitters, SSB transmission, F.M. transmitter, IC AM and FM standard transmitter.

UNIT IV

A.M. and F.M. Receivers, Superhetrodyne receivers, the complete A.M. receiver system, SSB receiver, F.M. receiver, Introduction To Television, Different Modulations Used In Television Transmission.

UNIT V

Pulse Analog Modulation, Practical Sampling, Analog pulse modulation, Time Division multiplexing (TDM) Synchronization in pulse modulated system, Noise in Continuous-wave modulation, baseband system, noise calculation in communication system noise in A.M and angle modulated system.

References

1. Chakrabarti------ Analog and digital Communication-Dhanpatrai & Com.
2. Wayne Tomasi---Electronic Communications Systems-Pearson Education Asia Publisher.
3. Taub, H., Shillmg D.L. ---Principles of Communication Systems-Tata-McGraw Hill, N.D.
4. B.P. Lathi, “Modern Digital & Analog Communication Systems”, Oxford University Press.
5. Simon Haykin / “Communication Systems” / John Wiley / 4th Ed.

Course Outcomes:

1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise

Effective from the session 2020-21
BET-C306
DIGITAL SYSTEM DESIGN

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Number System: Representation of negative numbers, 9's and 1's complement, 10's and 2's complement, arithmetic using 2's complement. BCD Code, Gray Code, Excess-3 Code, Introduction to Boolean algebra, Truth table verification of various gates, Realization of Switching functions with gates.
K- Map: Representation up to 4 variables, simplification and realization of various functions using gates, Tabular Method, Combinational logic and design procedure.

UNIT II

Combinational logic Circuits: Arithmetic circuits, Half and Full adder, Subtractors, BCD adders, Code Conversion, 4 bit Magnitude Comparator (IC -7485), Cascading of IC 7485, Decoder, Multiplexer, Demultiplexers, Encoders. Parallel Binary adder, IC 7483, 4-bit Binary parallel adder/subtractor,

UNIT III

Sequential Logic Circuits: Flip Flops, S-R latch, gated latches, Edge triggered Flip Flops, Master-slave Flip Flops, Conversion of flip flops, Analysis of clocked sequential circuits, Design of synchronous circuits, State transition diagram, state reduction and assignment.

UNIT IV

Counters: Design of Asynchronous and Synchronous Counters, Two bits & four bits up & down counters and their design, Shift registers, Serial & Parallel data transfer, Shift left/Right register, Shift Register applications.

UNIT V

Logic Families: Diode switching, Transistors as a switching element, MOS as a digital circuit element, concept of transfer characteristics, input characteristics and output characteristics of logic gates, fan in, fan out, noise margin, Logic families: TTL, IIL, ECL, NMOS, & CMOS, Open collector outputs.

Reference

1. M.Morris Mano, Digital Design, PHI
2. R.P.Jain, Modern Digital electronics, TMH
3. A.Anand Kumar, Fundamentals of Digital Circuits, PHI
4. Lee S.C, Modern Switching Theory and Digital design, PHI
5. Greenfield J.D., Practical Digital design using ICs, John Wiley.

Course outcomes:

At the end of this course students will demonstrate the ability to

1. Design and analyze combinational logic circuits
2. Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder
3. Design & analyze synchronous sequential logic circuits

Effective from the session 2020-21
BET-C354
ANALOG COMMUNICATION LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. To study Amplitude modulation using a transistor and determine depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. To study frequency modulation using reactance modulator.
4. Study of frequency modulation using varactor modulator.
5. Narrow band FM generator using Armstrong method.
6. Study of Foster- Seely discriminator.
7. Generation of DSB-SC signal using balanced modulator.
8. Generation of single side band signal.
9. Study of phase lock loop and detection of FM signal using PLL.
10. Measurement of noise figure using a noise generator.
11. Study of super heterodyne AM receiver and measurement of sensitivity, selectivity & fidelity.
12. Study and demonstration of active filter (low pass, high pass, and band pass type).

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BCE-C355
DATA STRUCTURE – I LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

Write Program in C

1. Array implementation of Stack.
2. Array implementation of Queue.
3. Array implementation of Circular Queue.
4. Implementation of Linked List.
5. Implementation of Circular Linked List
6. Implementation of Doubly Linked List
7. Implementation of Stack using list.
8. Implementation of Queue using list.
9. Implementation of Binary Search Tree, Tree Traversal.
10. Insertion and Deletion in BST.
11. Implementation of Searching and Sorting Algorithms.
12. Sort a double linked list.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-C355
DIGITAL SYSTEM DESIGN LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS :

1. To verify the truth tables of various types of gates using IC 7400.
2. To verify the truth tables of Multiplexer & also implement a function using Multiplexer.
3. To design & verify the truth table of half & full adder.
4. To design & verify the truth table SR flip-flop using NOR/NAND gates.
5. To design & verify the truth table JK flip-flop using NOR/NAND gates.
6. To design & study Counters.
7. To design & study Shift registers.
8. To verify the truth tables of de Multiplexer.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-S359
Summer Training and Internship Program-I/mini project
(3-4 weeks)

MM : 0 **Sessional : 50**
Time : 0 Hr **ESE : 0**
L T P **Credit : 1**
0 0 0

Guidelines:

1. The internship certificate will have to be submitted in the department after summer vacation for evaluation.
2. Students can choose to do internship or mini project or industrial training.
3. The mini-project is a team activity having 2-3 students in a team. This is electronic product design work with a focus on electronic circuit design.
4. The mini project may be a complete hardware or a combination of hardware and software. The software part in mini project should be less than 50% of the total work.
5. Mini Project should cater to a small system required in laboratory or real life.
6. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
7. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of mini-project.
8. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
9. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
10. Art work and Layout should be made using CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.
11. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.
12. The tutorial sessions should be used for discussion on standard practices used for electronic circuits/product design, converting the circuit design into a complete electronic product, PCB design using suitable simulation software, estimation of power budget analysis of the product, front panel design and mechanical aspects of the product, and guidelines for documentation/report writing.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on mini project work.

(Effective from the academic session 2020-21)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Second Year

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-IV

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C410	Digital Communication	3	0	0	20	10	30	70	100	3
BEE-C406	Electrical Circuits Analysis	3	0	0	20	10	30	70	100	3
BET-C411	Microprocessor and Interfacing	3	0	0	20	10	30	70	100	3
BET-C412	Electromagnetic waves	3	0	0	20	10	30	70	100	3
BET-C413	VLSI Design and Technology	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
BKT-A403	Bharteeya Jnanaparampara	2	0	0	20	10	30	70	100	0
PRACTICAL										
BET-C461	Microprocessor Lab	0	0	2	10	5	15	35	50	1
BET-C462	Circuit Simulation Lab	0	0	2	10	5	15	35	50	1
BET-C463	Digital Communication Lab	0	0	2	10	5	15	35	50	1
BET-C482	Seminar	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
TOTAL		17	0	8	160	80	240	560	800	19

Note: The students have to undergo an industrial training/mini project/internship program during summer vacation (June –July) after IV semester examination. The report and certificate of completion of training program has to be submitted in the department which will be evaluated in V semester. Also the students have to present PPT of the industrial training/mini project/internship.

Effective from the session 2020-21

BET-C410
DIGITAL COMMUNICATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Elements of Digital Communication and Information Theory: Model of a Digital Communication, System, Probability Theory and Random Variables, Logarithmic Measure of Information, Entropy and Information Rate, Conditional Entropy and Redundancy, Source Coding, Fixed and Variable Length Code Words, Source Coding Theorem, Prefix Doing and Kraft Inequality, Shannon-Fanno and Huffman Coding.

UNIT II

Digital Base band Transmission: PCM Coding, DM, DPCM, ADCM, Data Transfer Rate, Line Coding and Its Properties, NRZ & RZ Types, Signaling Format For Unipolar, Polar, Bipolar (AMI) & Manchester Coding and Their Power Spectra (No Derivation) Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to Noise Ratio. Correlation Detector Decision Threshold and Error Probability For Binary, Unipolar (ON-OFF) Signalling, ISI, Nyquist Criterion For Zero ISI & Raised Cosine Spectrum.

UNIT III

Digital Modulation Techniques: Gram-Schmidt Orthogonalization Procedure, Types of Digital Modulation, Wave forms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK Differential Phase Shift Keying, Quadrature Modulation Techniques QPSK, Probability of Error and Comparison of Various Digital Modulation Techniques.

UNIT IV

Digital Multiplexing: Fundamentals of Time Division Multiplexing, Electronic Commutator, Bit, Byte Interleaving T1 Carrier System, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals).

UNIT V

Error Control Coding: Error Free Communication Over a Noise Channel, Hamming code, Relation Between Minimum Distance and Minimum Distance Error Correcting Capability, Linear Block Codes, Encoding and Syndrome Decoding, Cyclic Codes, Encoder and Decoder For Cyclic Codes, Convolution Codes, Tree diagram state diagram and Trellis Diagram, Viterbi and Sequential Decoding, Comparison of Performance.

Reference

1. Haykin, Simon / “Communication Systems” / John Wiley / 4th Ed
2. Lathi, B.P / “Modern Digital & Analog Communication Systems” / Oxford University Press .

3. Taub & Schilling / "Principles of Communication Systems" / Tata McGraw-Hill /
4. A.B. Carlson / "Communication Systems" / Tata McGraw-Hill.
5. Charkrabarti, P. / "Analog Communication Systems" / Dhanpat Rai & Co.
6. Singh, R.P. & Sapre, S.D. / "Communication Systems: Analog & Digital" / Tata McGraw- Hill.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze and compare different digital modulation schemes for their efficiency and bandwidth
2. Analyze the behavior of a communication system in presence of noise
3. Investigate pulsed modulation system and analyze their system performance
4. Analyze different digital modulation schemes to compute the bit error performance

Effective from the session 2020-21
BEE-C406/BEE-C308
ELECTRICAL CIRCUITS ANALYSIS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Graph Theory : Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.

UNIT II

Network Theorems: Applications to ac networks- Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.

UNIT III

Network Functions: Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response and Bode plots.

UNIT IV

Two Port Networks: Characterization of LTI two port networks Z, Y, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T and Π Representation. Image parameters and characteristics impedance

UNIT V

Network Synthesis: Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.
Filters:, passive and active filter fundamentals, low pass, high-pass, band pass, band elimination filters.

Reference

1. M.E. Van Valkenburg, Network Analysis, Prentice Hall of India.
2. D. Roy Chaudhary, Networks and Systems, Wiley Eastern Ltd.
3. W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis, Tata McGraw Hill.
4. A. Chakrabarti, Circuit Theory, Dhanpat Rai & Co.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand basics electrical circuits with nodal and mesh analysis.

2. Appreciate electrical network theorems.
3. Apply Laplace Transform for steady state and transient analysis.
4. Determine different network functions.
5. Appreciate the frequency domain techniques.

Effective from the session 2020-21
BET-C411
MICROPROCESSOR AND INTERFACING

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction to Microprocessors and assembly language, 8085 architectures, addressing modes of 8085, 8085 instruction set and programming techniques, timing diagrams, Counters & time delays.

UNIT II

stacks and subroutines, basics of memory interfacing. Interfacing I/O Devices, programming of basic arithmetic operations: addition, subtraction, multiplication, division, code conversion etc, Interrupts.

UNIT III

Programmable Peripheral Interface(PPI) (8255), Programmable Interval Timer (8254), Programmable interrupt controller (8259), DMA & DMA controller (8237), ADC / DAC interfacing.

UNIT IV

8086 Processor: 8086 architectures, Pin configuration, 8086 in min/max mode, addressing modes, Instruction set of 8086, Assembler directives, basic assembly language programming.

UNIT V

Overview of Advanced Microprocessors- 80186,286,386,486, Pentium – I, Pentium – II, Pentium – III, Pentium – IV.

Reference

1. 8086 microprocessor: programming and interfacing the pc- K.J Ayala
2. Microprocessors and interfacing: Douglas hall.
3. Microprocessor, architecture, programming and applications with 8085 R.S Gaonkar.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Do assembly language programming
2. Do interfacing design of peripherals like, I/O, A/D, D/A, timer etc.

Effective from the session 2020-21
BET-C412
ELECTROMAGNETIC WAVES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Electrostatics – Fundamentals: Electric charges – Coulomb's Law – Electric Field Intensity – Linear, Surface and Volume charge density – Gauss Law and its application – electric Scalar Potentials and potential difference – Potential due to uniformly charged disc and uniformly charged line, potentials between two coaxial cylinders and between two conducting spherical shell – Electric field lines and equipotential contours – Potential gradient and electric field due to electric dipoles – Conservative nature of electric field.

UNIT II

Dielectrics & Capacitance: Dielectric boundaries – Capacitance – Capacitance of system of conductors Overhead lines and underground cables – Methods of images and its application Electrostatic energy and energy density – Force between charged conductors dielectric strength and breakdown. Divergence and curl of vector fields . Divergence theorem – Stokes theorem – solutions of electrostatic problems – Examples on Laplace's equation.

UNIT III

Magnetostatics Fundamentals: Magnetic field intensity and magnetic flux density, Biot Savarat law, Force between current carrying wires. Torque on closed circuits, Ampere's law Magnetic scalar and vector potentials – Boundary conditions at magnetic surfaces.

UNIT IV

Magnetic Circuits and Inductance: Faraday's law of electromagnetic induction , Inductor and inductance Inductance of solenoids, toroids, transmission lines and cables, Mutual inductance, Inductors in series and parallel, energy stored in magnetic field, Pull of an electromagnet magnetic circuits.

UNIT V

Electro Magnetic Waves: Maxwell's equations, Equation of continuity, displacement current , Maxwell's equation in point and integral forms ,The wave equations, Uniform plane wave , relation between electric and magnetic field intensities in a uniform plane wave, Poynting vector , Poynting theorem, boundary conditions.

References

1.Gangodhar, K.A., ' Field Theory', Khanna Pub. Delhi 11th edition, 1994.
2. William H. Hayt, ' Engineering electromagnetics', Tata- McGraw Hill, 5th edition, 1992.
3. Sarwate, V.V., ' Electromagnetic Fields and Waves', Wiley Eastern Limited, New Delhi, 1993.
4. Mahajan, A.S. and Rangawala, A.A. 'Electricity and Magnetism, Tata-McGraw Hill Publishing Company, Ld, New Delhi, 1989.
5. Seely, S., Introduction to electromagnetic Fields', McGraw Hill.
6. Joseph, a. Edminister, ' Electromagnetic – Schaum's outline Series', International Edition, McGraw

Hill Inc., New York, 1993.
7. Narayana Rao, N., 'Elements of Engineering Electromagnetics', Prentics Hall of India, 1991.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand characteristics and wave propagation on high frequency transmission lines
2. Carryout impedance transformation on TL
3. Use sections of transmission line sections for realizing circuit elements
4. Characterize uniform plane wave
5. Calculate reflection and transmission of waves at media interface
6. Analyze wave propagation on metallic waveguides in modal form
7. Understand principle of radiation and radiation characteristics of an antenna

Effective from the session 2020-21

BET-C413
VLSI DESIGN AND TECHNOLOGY

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT I

Introduction to ICs and MOS Review: Evolution of Integrated Circuit (ICs), VLSI Design Flow, Review of Basic Metal Oxide Semiconductor (MOS) structure, MOSFET, Current-Voltage Characteristics, Threshold Voltage, Body Bias concept, MOSFET Capacitances, Technology Scaling Theory, Long channel & Short channel characteristics, and short channel effects (SCEs).

UNIT II

Basic of Semiconductor Fabrication: Crystal Growth, Epitaxial- Growth Techniques, Structures and Defects, Film Formation, Deposition methods, Thermal Oxidation, Dielectric Deposition, Polysilicon and High-K dielectric, Lithography, Next Generation Lithographic Methods, Dry and Wet Chemical Etching, Impurity Doping, Diffusion-Related Processes, Implant-Related Processes, Annealing, Metallization, Integrated Devices, CMOS Fabrication Process, IC Packaging, Material and Device Characterization.

UNIT III

Static Inverter Design & Performance Metrics: Static NMOS and CMOS Inverter circuits, Static and Dynamic characteristics, Estimation of Noise Margin, Delay, Power Consumption (dynamic and static) and Energy, CMOS Latch up, Stick diagram and Layout. Combinational CMOS logic circuits.

UNIT IV

Various MOS Logic Circuits: Brief overview of Complementary CMOS, Ratioed Logic, Pass Transistor Logic and transmission gate etc. Dynamic CMOS Logic, Advantages & Disadvantages over static CMOS, Charge sharing, Domino and NORA logic.

UNIT V

Memories and array structures: basics of ROM and RAM cells design, SRAM & DRAM cell and arrays, memory peripheral circuits. Introduction to BiCMOS technology and Inverter. Basic BiCMOS Circuit behavior.

References

1. Rabaey, J. M. Digital Integrated Circuits - A Design perspective. 2nd ed. Pearson Education, 2002.
2. Sze, S.M. VLSI Technology. 2nd ed., New Delhi: Tata McGraw-Hill, 2011.
3. Kang, S. M., Leblebici, Y and Kim, C. CMOS Digital Integrated Circuits, 4th ed., McGraw Hill India, 2016.
4. Martin, K. Digital integrated circuit design. Oxford University Press, 2003.

5. Weste, N., and Eshraghian, K. Principles of CMOS VLSI Design – A Systems perspective. 2nd ed., Pearson, 1993.
6. Ghandhi, S.K. VLSI Fabrication Principles. 2nd ed., New Delhi: Wiley India, 2010.
7. Plummer, James D. Silicon VLSI Technology Fundamentals: Practice and Modeling, Pearson Education, 2009, Simon Sze. Semiconductor devices & Technology: Mc

Course Outcomes:

At the end of the course the students will be able to

1. Design different CMOS circuits using various logic families along with their circuit layout.
2. Use tools for VLSI IC design.

Effective from the session 2020-21
BET-C461
MICROPROCESSOR LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. Addition of 8 bit hexadecimal numbers without carry.
2. Addition of 8 bit hexadecimal numbers with carry.
3. To calculate 2's compliments of a 8 bit number.
4. Subtraction of two 8 bit hexadecimal number.
5. Interfacing with 8255 in I/O mode & BSR mode.
6. Verification of all interrupts.
7. Multiplication of 8 bit hexadecimal number by 2.
8. Division of 8 bit hexadecimal numbers.
9. Addition of two 8 bit decimal numbers.
10. Transfer the block from one memory location to another.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-C462
CIRCUIT SIMULATION LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

Electronic Workshop & PCB

1. Winding Shop: Step down transformer winding of less than 5VA.
2. Soldering Shop: Fabrication of DC unregulated power supply.
3. PCB Lab: (a) Artwork & printing of a simple PCB.
   (b) Etching & drilling of PCB.

Wiring & Fitting Shop: Fitting of Power Supply along with a meter in cabinet.

4. Testing of Power Supply fabricated.
5. Design, simulation and Analysis of circuits using circuit simulator:
6. Layout design of 5 V regulated supply.

MATLAB Exercises

7. (i) Write a MATLAB program to find the roots of a quadratic equation.
   (ii) Write a MATLAB program to find the factorial.
   (iii) Simulate an RC circuit in MATLAB.
   (iv) Write a MATLAB program to draw I-V characteristic of a MOSFET.
   (v) Write a MATLAB program to find the average with a dynamic array.
   (vi) Plot one and two-dimensional graphs using various MATLAB 2-D Plot types.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21

BET-C463
DIGITAL COMMUNICATION LAB

MM : 50 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. Study of Sample and hold circuit using Op-amp.
2. Study of PAM generation and detector and observe characteristics of both single and dual polarity pulse amplitude modulation.
3. Study of pulse width modulation and demodulation.
4. Study of pulse position modulation demodulation.
5. Study of delta modulation and demodulation and observe effect of slope overload.
6. Study of pulse data coding techniques for NRZ formats.
7. Data decoding techniques for NRZ formats.
8. Study of amplitude shift keying modulator and demodulator.
9. Study of frequency shift keying modulator and demodulator.
10. Study of phase shift keying modulator and demodulator .
11. Study of single bit error detection and correction using Hamming code.
12. Study of Pulse code modulation and demodulation.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2020-21
BET-C482
SEMINAR

MM: 50

L	T	P
0	0	2

Credit: 1

Objective: To increase the communication ability on students and to prepare them for presenting seminar on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest in or any advanced technical topics related to the theory papers studied. The topic will be decided by mutual consent of the Faculty- in- charge and students.

* Total 50 marks include 15 marks for report and 35 marks for presentation.

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – III YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY

BOARD OF SYLLABUS

09 July 2021

(w.e.f. Batch 2019 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

(Effective from the academic session 2021-22)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Third Year (SEMESTER-V)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-V

DSC/SEC/DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C510	Signals & Systems	3	0	0	20	10	30	70	100	3
BET-C511	Analog Circuits	3	0	0	20	10	30	70	100	3
BET-C512	Electronics Measurement and Instrumentation	3	0	0	20	10	30	70	100	3
BET-C513	Control System	3	0	0	20	10	30	70	100	3
BET-M001	Universal Human Values	3	0	0	20	10	30	70	100	3
BCE-P515	Object Oriented Programming using C++	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								18
PRACTICAL										
BET-C561	System Engineering Lab	0	0	2	10	5	15	35	50	1
BET-C562	Analog Circuits Lab	0	0	2	10	5	15	35	50	1
BET-C563	Electronics Measurement and Instrumentation Lab	0	0	2	10	5	15	35	50	1
BET-S559	Summer Training and Internship Program-II/mini project (3-4 weeks)	To be pursued during summer vacation, submit a certificate of completion in the department(in summer break after IV semester exam and will be assessed during V semester)							50	1
		TOTAL CREDITS								4
TOTAL		18	0	6	150	75	225	525	800	22

Batch 2019-2023 and onwards

Effective from the session 2021-22

BET-C510

SIGNALS AND SYSTEMS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. Understand the concepts of continuous time and discrete time systems.
2. Analyse systems in complex frequency domain.
3. Understand sampling theorem and its implications.

UNIT I

Signals and Systems: Continuous-time and discrete-time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, Continuous-Time and Discrete-Time LTI Systems and their properties, convolution sum and convolution integrals, Characterization of causality and stability of linear shift-invariant systems. System representation through differential equations and difference equations.

UNIT II

Fourier Series and Fourier Transform: The response of LTI Systems to Complex Exponentials, Fourier Series Representation of Continuous-time Periodic Signals and their Properties, Continuous time and discrete time Fourier Transforms and their properties, System Characterized by Linear Constant Coefficient Differential equations and Difference equations.

UNIT III

Time and Frequency Characterization of Signals and Systems: Magnitude Phase Representation of the Fourier Transform, Magnitude Phase Representation of the Frequency response of LTI systems, Time domain Properties of Ideal Frequency Selective filter, Time Domain and Frequency Domain aspects of Non ideal filters, First Order and Second Order Continuous Time and Discrete time Systems.

UNIT IV

Sampling and Laplace Transform: Signal representation by samples, sampling theorem, Impulse train sampling, sampling of discrete time signals, discrete time processing of continuous time signals. Laplace Transform, Region of convergence, inverse Laplace Transform, Analysis and characterization of LTI System, Block diagram representation, Unilateral Laplace transform.

UNIT V

Z-Transform: Z-Transform, Region of convergence, Inverse Z-transform, analysis and characterization of LTI system, Block diagram representation, Unilateral Z-transform. Random variable, random process correlation functions, Signals and systems as seen in everyday life, and in various branches of engineering and science.

Course outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze different types of signals
2. Represent continuous and discrete systems in time and frequency domain using different transforms
3. Investigate whether the system is stable
4. Sampling and reconstruction of a signal

Text Book

V. Oppenheim, A.S. Willsky and S. Hamid Nawab, ‘signals & System’, Pearson Education, Second Edition, 2003.

Reference Books:

1. Roberts, “Signals and Systems” Tata McGraw Hills.
2. P. Ramesh Babu, R. Ananda Natarajan,”Signals and Systems”, SCITECH Publications.
3. Charles L. Phillips, John M.PARR and EVEA. RISKIN, “Signals, Systems and Transforms”, PEARSON Education, Third Edition.
4. Chen ‘Signals & Systems, Oxford University, Press.

Effective from the session 2021-22

BET-C511

ANALOG CIRCUITS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. Understand the basic concepts of differential amplifier.
2. Study of operational amplifiers fundamentals.
3. Analyse various waveform generators.
4. Understand active filters, oscillators and voltage regulators and their implications.

UNIT I

Multistage Amplifier: Effect of coupling and by-pass capacitors, types of coupling (DC, RC and TC), Darlington connection, cascode amplifier, coupling schemes for multistage amplifier and frequency response of transistor amplifier.Power amplifiers: ClassA, Class B, Class C and Class AB amplifiers and their efficiencies, harmonic distortion, push-pull amplifier. Basic idea of tuned amplifier.

UNIT II

IC OP-AMP Applications: OP-AMP Fundamentals (brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics) Basic building blocks using OP-AMPS. Inverting/ Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, Instrumentation Amplifiers.

UNIT III

Waveform Generator: Square wave generators: 555Timer, Triangle generator, sawtooth generator, Sine wave generator, Wien-bridge and twin-T oscillators. Function Generators: Multi op-amp function generators, IC function generators, Non-**linear Circuits:** Logarithmic Amplifiers, Log/Antilog Modules, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square and Triangular Wave Generator, Monostable multivibrator. IC Analog Multiplier applications OTA

UNIT IV

Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, Active versus passive filters, Low pass filter: First order low pass active filter, second order active filter model, second order low pass filter characteristics, Higher order filters. High pass active filter. Band pass filter: single op-amp band pass filter; multistage band pass filter.

UNIT V

Oscillators: Positive feedback, Berkhausen criterion for sinusoidal oscillation, Phase-shift oscillator, Weinbridge oscillator, Tuned oscillator, Hartley, Colpitts and Crystal oscillator.
Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.
Course Outcomes:
At the end of this course students will demonstrate the ability to
1. Understand the characteristics of diodes and transistors
2. Design and analyze various rectifier and amplifier circuits
3. Design sinusoidal and non-sinusoidal oscillators
4. Understand the functioning of OP-AMP and design OP-AMP based circuits
5. Design ADC and DAC

Text/ Reference Books

1. Sedra and Smith, Microelectronic Circuits", Oxford University press, 5th Edition, 2005.
2. J. Michael Jacob, Applications and design with Analog Integrated Circuits", PHI, 2nd Edition, 2004
3. Gayakwad, R.A, Op-Amp and LINEAR INTEGRATED CIRCUITS, PHI

Effective from the session 2021-22

BET-C512

ELECTRONICS MEASUREMENT AND INSTRUMENTATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVESs:

1. To provide a basic knowledge about measurement systems and their components
2. To learn about various sensors used for measurement of mechanical quantities
3. To integrate the measurement systems with the process for process monitoring and control

UNIT I

Theory of Measurement: Introduction, Performance Characteristics: static & dynamic standards, Error analysis: Sources, types and statistical analysis, Transducers: Passive transducers: Resistive, Inductive and capacitive, Active transducers: Thermoelectric, piezoelectric & photoelectric. Bridges: Direct current and alternating current bridges, LCR bridges.

UNIT II

Analog Meters: AC analog meters: Average, Peak and RMS responding voltmeters, sampling voltmeters. Electronics Analog meters, Electronics analog DC and AC voltmeters and ammeters, Electronic analog ohmmeter and multimeter.

UNIT III

Digital Meters: Analog to digital converter: Transfer characteristics, A/D Conversion technique, Simple potentiometric & servo method, successive approximation, ram type, Integrating & dual-slope integrating method. D/A Converter: Transfer characteristics, D/A conversion techniques digital mode of operation, performance characterstics of D/A converters.

Display devices: Decimal, BCD and straight binary number, indicating system, numeric & alpha number display using LCD & LED, specification of digital meters: display digit & counts resolution, sensitivity, accuracy, speed & settling time etc.

UNIT IV

Oscilloscopes & RF Measurements: Types of oscilloscopes, controls, Measurements voltage, frequency time & Phase. High frequency measurements – RF impedance. Probes: Types of probes probe loading & measurement effect, probe specifications.

Signal Generators & Analyzers: frequency synthesis techniques & digital signal generators. Signal Analyzers :Distortion, wave and Network spectrum analyzers.

UNIT V

SCADA: need of SCADA system, distributed control system (DCS), General definition and SCADA components. Hardware architecture, software architecture, protocol detail, discrete control and analog control, application & benefits, PLCs Vs RTUs, RTU block diagram, MTU communication interface, future trends, Internet based SCADA display system, functional block, structural text, instruction, ladder diagram, trouble shooting, features.

Course Outcome

- To analyze the errors during measurements.
- To specify the requirements in the calibration of sensors and instruments.
- To describe the noise added during measurements and transmission.
- To describe the measurement of electrical variables.
- To describe the requirements during the transmission of measured signals.
- To suggest proper sensor technologies for specific applications.
- To design and set up measurement systems and do the studies

Text Books:

1. Electronic Instruments & Instrumentation Technology by MMS Anand, PHI Pvt. Ltd., New Delhi Ed. 2005.

2. Electronics Instrumentation by H.S. Kalsi TMH Ed. 2004.

Reference Books:

1. Electronics Instrumentation & Measurement Techniques by W.D. cooper & A.D. Helfrick, PHI 3rd Ed.
2. Electronic Measurement & Instrumentation by Oliver & Cage Mc-Graw Hill.
3. SCADA: by Stuart A. Boyer, IAS 1999.

Effective from the session 2021-22

BET-C513

CONTROL SYSTEM

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

- To learn about the modelling of linear-time-invariant systems using transfer function and state-space representations.
- To provide the basic concept of stability and its assessment for linear-time invariant systems.
- To Design simple feedback controllers.

UNIT I

Control System: Open loop & closed control; servomechanism, Physical examples. Transfer functions, Block diagram algebra, Signal flow graph, Mason's gain formula Reduction of parameter variation and effects of disturbance by using negative feedback.

UNIT II

Time Response Analysis: Standard test signals, time response of first and second order systems, time response specifications, steady state errors and error constants Design specifications of second order systems: Derivative error, derivative output, integral error and PID compensations, design considerations for higher order systems, performance indices.

UNIT III

Control System Components: Constructional and working concept of ac servomotor, synchros and stepper motor.
Stability and Algebraic Criteria: Concept of stability and necessary conditions, Routh- Hurwitz criteria and limitations.

Root Locus Technique: The root locus concepts, construction of root loci.

UNIT IV

Frequency Response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots.
Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

UNIT V

Introduction to Design: The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.
Review of State Variable Technique: Review of state variable technique, conversion of state variable model to transfer function model and vice-versa, diagonalization, Controllability and observability and their testing.

Course Outcomes:

1. Characterize a system and find its study state behavior
2. Investigate stability of a system using different tests
3. Design various controllers
4. Solve liner, non-liner and optimal control problems

Text Books

1. Nagrath& Gopal, Control System Engineering, 4th Edition, New age International.
2. K. Ogata, Modern Control Engineering, Prentice Hall of India.

Reference Books

1. Norman S. Mise, Control System Engineering 4th edition, Wiley Publishing Co.
2. M.Gopal, Control System; Principle and design, Tata McGraw Hill.
3. M.Gopal, Modern Control system, Tata McGraw Hill.
4. D.Roy Choudhary, Modern Control Engineering, Prentice Hall of India.

Effective from the session 2021-22

BET-M001

UNIVERSAL HUMAN VALUES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES: The objective of the course is four fold:

1.Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

UNIT I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education.

Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration–what is it? - Its content and process; 'Natural Acceptance'and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Priority Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

UNIT II

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient 'I'& the Material 'Body'. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I'Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT III

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention & competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT IV

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence.

Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. At the level of society: as mutually enriching institutions and organizations. Sum up Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Course Outcome:

1. By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature).
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
3. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
4. This is only an introductory foundational input. It would be desirable to follow it up by

a) faculty-student or mentor-mentee programs throughout their time with the institution.
b) Higher level courses on human values in every aspect of living. E.g. as a professional.

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books,New Delhi, 2010

Reference Books

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Effective from the session 2021-22

BCE-P515

OBJECT ORIENTED PROGRAMMING USING C++

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

The course will introduce standard tools and techniques for software development, using object oriented approach, use of a version control system, an automated build process, an appropriate framework for automated unit and integration tests.

UNIT I

Introduction: Review of C, Difference between C and C++, Cin, Cout, new, delete operators, abstraction, encapsulation, inheritance, polymorphism, Structured versus object-oriented development, elements of object-oriented programming.
Class Overview: Class specification, class objects, accessing class members, defining member functions, outside member functions as inline, accessing member functions within a class, data hiding, access boundary of objects revisited, empty classes, pointers within a class, passing objects as arguments, returning objects from functions, friend functions and friend classes, constant parameters and member functions, structures and classes, static data and member functions, class, objects and memory resource, class design steps.

UNIT II

Object Initialization and Cleanup: Class revisited, constructors, parameterized constructors, destructor, constructor overloading, order of construction and destruction, constructors with default arguments, copy constructor, static data members with constructors and destructors.
Operator Overloading: Introduction, over loadable operators, unary operator overloading, operator keyword, operator return values, limitations of increment/decrement operators, binary operator overloading, arithmetic operators, data conversion, conversion between basic data types, conversion between objects and basic types, conversion between objects of different classes, overloading with friend functions.

UNIT III

Inheritance: Introduction, class revised, derived class declaration, forms of inheritance, inheritance and member accessibility, constructors in derived classes, destructors in derived classes, constructors invocation and data members initialization, overloaded member functions, multilevel inheritance, multiple inheritance, hierarchical inheritance, multi-path inheritance and virtual base classes, hybrid inheritance.

UNIT IV

Virtual Functions and Classes: Introduction, need for virtual functions, static and dynamic binding, pointer to derived class objects, definition of virtual functions, pure virtual functions, abstract classes, virtual destructors.
Generic Programming with Templates: Introduction, function templates, overloaded function templates, multiple arguments function templates, user defined template arguments, class templates.

UNIT V

Stream Computation with Files: Introduction, hierarchy of file stream classes, opening and closing of files, testing for errors, file modes, file pointers and their manipulators, sequential access to a file, ASCII and binary files, saving and retrieving of objects, file input/output with stream class.
Exception Handling: Introduction, error handling, exception handling model, exception handling constructs.

Course Outcomes:

After taking the course, students will be able to:
1. Specify simple abstract data types and design implementations, using abstraction functions to document them.
2. Recognise features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.
3. Name and apply some common object-oriented design patterns and give examples of their use.

4. Design applications with an event-driven graphical user interface.

References

1. E.Balagurusamy, Object Oriented Programming with C++, TMH
2. R.Lafore, Object Oriented Programming using C++, Galgotia
3. S.B.Lippman&J.Lajoie, C++ Primer, Addison Wesley
4. G.Booch, Object Oriented Design & Applications, PHI

Effective from the session 2021-22

BET-C561
SYSTEM ENGINEERING LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. To measure frequency and level of a given unknown signal.
2. To measure harmonics of SINE WAVE.
3. To check Frequency response of a 'LOW PASS' filter.
4. To check Frequency response of a 'HIGH PASS' filter.
5. To check Frequency response of a 'BAND PASS' filter.
6. To construct a triangular wave with the help of fundamental frequency and its harmonic components.
7. To construct a rectangular sawtooth wave with the help of fundamental frequency and its harmonic components.
8. To construct square wave with the help of fundamental frequency and its harmonic components.
9. To construct Half sine wave with the help of fundamental frequency and its harmonic components.
10. Study of signal sampling and reconstruction techniques.
11. To calculate and verify time response of low pass filter.
12. To calculate and verify time response of high pass filter.

NOTE

1. A teacher shall be assigned 20 students for daily practical work in laboratory.
2. No batch for practical class shall consist of more than 20 students.
3. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
4. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2021-22

BET-C562

ANALOG CIRCUITS LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENTS:

1. To draw the frequency response curve of RC Coupled Amplifier.
2. To draw the frequency response curve of Transformer Coupled Amplifier.
3. To find the efficiency of A, B & AB Push pull Amplifier.
4. To find the frequency of oscillation of various Oscillator.
5. To find the CMRR of differential amplifier.
6. To study the gain and frequency response of Inverting Amplifier and Non Inverting Amplifier.
7. To study the operational amplifier as Differentiator and Integrator.
5. To study the Op-Amp as summer and subtractor.
8. To study the OP-AMP as square wave generator.
9. To study 2nd order Low Pass active Filter and High Pass active Filter.
10. To study the hysteresis characteristics of the Op- Amp based Schmitt trigger.
11. To study the monostable multivibrator using Timer IC 555.
12. To find the frequency of oscillation for astable multivibrator using Timer IC 555.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2021-22

BET-C563

ELECTRONICS MEASUREMENT AND INSTRUMENTATION LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. To draw characteristics of Strain Gauge. (Strain vs Resistance)
2. To study the measurement of Angular Displacement trainer.
3. To study of speed measurement using Electromagnetic pick up
4. To study of speed measurement using Photo Electric pick up.
5. To draw a curve of displacement vs. voltage by L.V.D.T.
6. To study performance characteristics of Load Cell.
7. To measure pressure using Strain Gauge.
8. To measure temperature by using R.T.D demonstration set up.
9. To study the Thermistor Demonstration Trainer.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2021-22

BET-S559

Summer Training and Internship Program-I/mini project

(3-4 weeks)

MM : 0 **Sessional : 50**
Time : 0 Hr **ESE : 0**
L T P **Credit : 1**
0 0 0

Guidelines:

1. The internship certificate will have to be submitted in the department after summer vacation for evaluation.
2. Students can choose to do internship or mini project or industrial training.
3. The mini-project is a team activity having 2-3 students in a team. This is electronic product design work with a focus on electronic circuit design.
4. The mini project may be a complete hardware or a combination of hardware and software. The software part in mini project should be less than 50% of the total work.
5. Mini Project should cater to a small system required in laboratory or real life.
6. It should encompass components, devices, analog or digital ICs, micro controller with which functional familiarity is introduced.
7. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of mini-project.
8. Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester.
9. The student is expected to exert on design, development and testing of the proposed work as per the schedule.
10. Art work and Layout should be made using CAD based PCB simulation software. Due considerations should be given for power requirement of the system, mechanical aspects for enclosure and control panel design.
11. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.
12. The tutorial sessions should be used for discussion on standard practices used for electronic circuits/product design, converting the circuit design into a complete electronic product, PCB design using suitable simulation software, estimation of power budget analysis of the product, front panel design and mechanical aspects of the product, and guidelines for documentation/report writing.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

1. Conceive a problem statement either from rigorous literature survey or from the requirements raised from need analysis.
2. Design, implement and test the prototype/algorithm in order to solve the conceived problem.
3. Write comprehensive report on mini project work.

(Effective from the academic session 2021-22)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Third Year (SEMESTER-VI)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VI

DSC/SEC/ DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BET-C610	Embedded systems	3	0	0	20	10	30	70	100	3
BCE-C637	JAVA Programming and Introduction of Python	3	0	0	20	10	30	70	100	3
BET-C612	Digital Signal Processing	3	0	0	20	10	30	70	100	3
	Program Elective – I	3	0	0	20	10	30	70	100	3
	Open Elective-I	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								15
PRACTICAL										
BET-C661	Embedded System Lab	0	0	2	10	5	15	35	50	1
BET-C662	Digital Signal Processing Lab	0	0	2	10	5	15	35	50	1
BCE-C657	JAVA Programming and Introduction of Python Lab	0	0	2	10	5	15	35	50	1
BET-C663	Seminar	0	0	2	10	5	15	35	50	1
		TOTAL CREDITS								4
TOTAL		15	0	8	140	70	210	490	700	19

Program Elective Subject List

BET-P610: Antenna and Wave Propagation
BET-P611: Power Electronics
BET-P612: Nano Electronics
BET-P613: Probability Random and Stochastic Process

Open Elective Subject List

BET-O630: Intellectual Property Rights
BEE-O631: Industrial Electrical systems
BEE-O632: Sensors and Transducers
BET-O633: Data Communication and Networks Protocols

Effective from the session 2021-22

BET-C610

EMBEDDED SYSTEMS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. To understand the practical issues related to practical implementation of applications using electronic circuits.
2. Choose appropriate components, software and hardware platforms.
3. Work as a team with other students to implement an application.

UNIT I

Introduction: Embedded systems and its applications, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design. Hardware Fundamentals for the embedded developers Digital circuit parameters. Open collector outputs Tristate outputs I/O sinking and Sourcing, PLD's, Watchdog Timers, Hardware design and development.

UNIT II

Custom Single Purpose Processors: Optimizing program, FSMD, Data path & FSM. General purpose processors and ASIP's (Application Specific Instruction set Programming): Software and operation of general purpose processors-Programmers View Development Environment-ASIPs Microcontrollers- DSP Chips.

UNIT III

Introduction to Microcontrollers and Micoprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures. 8051 Microcontrollers-Assembly language, architecture, registers, Addressing modes, Instruction set, I/O ports and memory organization Interrupts Timer/counter and serial communication.

UNIT IV

RTOS-Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes. Advanced Processor-(only architectures) 80386, 80486 and ARM (References)

UNIT V

Communication basics, Microprocessor Interfacing I/O Addressing, Direct memory access, Arbitration, multilevel bus architecture, Serial protocols, Parallel protocols and wireless protocols. Real world Interfacing: LCD, Stepping Motor, ADC, DAC, LED, Push Buttons, Key board, Latch Interconnection, PPI.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Suggest design approach using advanced controllers to real-life situations.
2. Design interfacing of the systems with other data handling / processing systems.
3. Appreciate engineering constraints like energy dissipation, data exchange speeds etc.

Text Book

Embedded System Design-Frank Vahid/Tony Givargis, John Willey,2005.

References Books

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillispie.
2. Microcontrollers (Architecture, Implementation & Programming) Kenneth Hintz, Daniel Tabak, Tata McGraw-Hill, 2005.
3. 8051 Microcontrollers & Embedded Systems 2nd Edition-Sampath Kr, KatsonBooks, 2006.
4. Microcontroller (Theory and Applications) Ajay V Deshmukh, Tata McGraw-Hill, 2005.
5. An Embedded Software Primer-David E.Simon, Pearson Education, 1999.

Effective from the session 2021-22

BCE-C637

JAVA PROGRAMMING AND INTRODUCTION OF PYTHON

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. To acquire programming skills in JAVA and core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical User Interfaces in Python
4. To develop the ability to write database applications in Python

UNIT I

Introduction: Features of Java byte code, data types, variables, declaring variables, arrays, operators, control statements, type conversion and casting, compiling and running of simple Java program.

Classes and Objects: Concepts of classes and objects, class fundamentals Declaring objects, assigning object reference variables, introducing methods, constructors, usage of static with data and methods, usage of final with data, access control, this key word, overloading methods and constructors, parameter passing – call by value, nested classes and inner classes, exploring the String class.

UNIT II

Inheritance: Basic concepts, member access rules, usage of super key word, forms of inheritance, method overriding, abstract classes, dynamic method dispatch, using final with inheritance.

Packages and Interfaces: Defining, Creating and Accessing a Package, understanding class path, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT III

Exception Handling and Multithreading: Concepts of Exception handling, types of exceptions, usage of try, catch, throw, throws and finally keywords, Built-in exceptions, creating own exception sub classes, Concepts of Multithreading, thread life cycle, creating multiple threads using Thread class, Runnable interface.

UNIT IV

Introduction to Python – Installation, Python Interpreter, Variables, Expressions and Statement – Assignment statements, Variables Name, Expressions & Statements, Order of Operations & String Operations. Functions

UNIT V

Strings, Lists, Dictionaries, Tuples – Introduction to Strings, Lists, Dictionaries and Tuples.

COURSE OUTCOMES:

At the end of the course, the student will be able to Bloom's Level

1. Explain basic principles of Python programming language
2. Implement object oriented concepts,
3. Implement database and GUI applications.

References

1. The Python Tutorial available at http://docs.python.org/3.3/tutorial/
2. How to Think Like a Computer Scientist: Learning with Python (3nd edition) by: PeterWentworth Jeffrey Elkner, Allen B. Downey, and Chris Meyers. Free Online Version:http://openbookproject.net/thinkcs/python/english3e/
3. Python Documentation available at http://www.python.org/doc/
4. A Byte of Python by Swarooph CH available at http://swaroopch.com/notes/python/
5. Herbert Schildt, The Complete Reference Java J2SE 5th Edition, TMH PublishingCompany Ltd.

Effective from the session 2021-22

BET-C612

DIGITAL SIGNAL PROCESSING

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVES:

1. Understand the concepts of Digital signals with the help of DFT and Z transform etc.
2. Analyse systems in complex frequency domain.
3. Understand various digital filtering technique and their implications.

UNIT I

Discrete Fourier Transform: Frequency Domain Sampling: The Discrete Fourier Transform Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals. The Discrete Fourier Transform (DFT). The DFT as a linear Transformation. Relationship of the DFT to Other Transforms. Properties of the DFT. Periodicity, Linearity, and Symmetry Properties. Multiplication of two DFTs and Circular Convolution. Additional DFT Properties. Frequency analysis of signals using the DFT.

UNIT II

Efficient Computation of DFT: Efficient Computation of the DFT: FFT Algorithms, Direct Computation of the DFT. Radix-2 FFT algorithms. Efficient computation of the DFT of two real sequences, computations, efficient computation of the DFT of a 2NPointreal sequences, Gortezel Algorithm, Chirp Z-transform algorithm.

UNIT III

Basic IIR Filter Structures: Direct forms (I & II), cascade and parallel realizations. Signal flow graph, Transposed structure, Basic FIR filter structures-. Direct form structure, frequency sampling structure, Lattice structure, Linear phase FIR structure. FIR structures.

UNIT IV

Symmetric and Anti-symmetric FIR Filters, Design of Linear-Phase FIR Filters Using Windows, Design of Linear-Phase FIR Filters by the Frequency Sampling Method, Design of FIR, Equi-ripple filter design Differentiators. Design of Hilbert Transformers.

UNIT V

Design of IIR Filters from Analog Filters: IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariance. IIR Filter Design by the Bilinear Transformation. The Matched-z Transformation, Characteristics of Commonly Used Analog Filters. Application of above technique to the design of Butterworth & Chebyshev filters. Introduction to STFT, wavelets multirate Signal Processing architecture of DSP processor and application.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Represent signals mathematically in continuous and discrete time and frequency domain
2. Get the response of an LSI system to different signals
3. Design of different types of digital filters for various applications

Text Book

Proakis, J.G &Manolakis, D.G., “Digital Signal Processing: Principles Algorithms and Applications”, Prentice Hall (India).

Reference Books

1. Sanjit K. Mitra, “Digital Signal Processing”, Third Edition, TMH, 2005.
2. Oppenheim A.V. & Schafer, Ronald W., “Digital Signal Processing”, Pearson Education.

Effective from the session 2021-22

BET-P610

ANTENNA AND WAVE PROPAGATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

Students will be introduced to antennas, their principle of operation Antenna analysis and their applications. Introduce the student to wave propagation over ground, through troposphere and ionosphere; diversity principles, Propagation effects in microwave systems, satellite, space, and radar links.

UNIT I

Antenna Principles: Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, radiation resistance. Network Theorems Directional Properties of Dipole Antenna. Antenna Gain, Effective Area, Antenna Terminal Impedance, Practical Antennas and Methods of Excitation, Antenna Temperature and Signal to Noise Ratio.

UNIT II

Antennas Arrays: Two Element Array, Horizontal Patterns in Broadcast Arrays, Linear Arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array, Chebyshev Array.

UNIT III

Practical Antennas: VLF and LF transmitting antennas, effect of antenna height, Field of short dipole, electric field of small loop antenna, Directivity of circular loop antenna with uniform current, Yagi-Uda array: Square corner yagi-uda hybrid, circular polarization Rhombic Antenna: Weight and Leg length Parabolic Reflectors: Properties, Comparison with corner reflectors Horn Antenna: Length and Aperture, Introduction to metamaterial, Use of metamaterial in antenna application.

UNIT IV

Antenna Measurements: Radiation Pattern measurement, Distance requirement for uniform phase, uniform field amplitude requirement, Introduction to phase measurement; Gain Measurement: Comparison method, Near field method, Introduction to current distribution measurement, Measurement of antenna efficiency, measurement of Noise figure and noise temperature of an antenna polarization measurement.

UNIT V

Wave Propagation: Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and refraction waves by the Ionosphere Tropospheric Wave. Ionosphere Wave Propagation in the Ionosphere, Virtual Height, MUF Critical frequency, Skip Distance, Duct Propagation, Space wave. Antenna theory to supported with antenna Lab. So antenna equipmentis to be procured.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand the properties and various types of antennas.
2. Analyse the properties of different types of antennas and their design.
3. Operate antenna design software tools and come up with the design of the antenna of required specifications.

Text Books

1. Jordan Edwards C. and Balmain Keith G./ "Electromagnetic Waves and Radiating Systems"/ Prentice Hall (India)
2. Kraus, John D. & Mashefka, Ronald J. / "Antennas: For All Applications" / Tata McGraw Hill, 3rd Ed.

Reference Books:

1. Prasad, K.D./ "Antennas and Wave Propagation"/ Khanna Publications
2. Collin, R. / "Antennas and Radiowave Propagation" / Tata McGraw-Hill
3. Das, Annaparna& Das, Sisir K. / "Microwave Engineering"/ Tata McGraw Hill.

Effective from the session 2021-22

BET–P611

POWER ELECTRONICS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
2. To familiarize students to the principle of operation, design and synthesis of different power conversion circuits and their applications.
3. To provide strong foundation for further study of power electronic circuits and systems.

UNIT-I

Characteristics of Semiconductor Power Devices: Thyristor, power MOSFET and IGBT- Treatment should consist of structure, Characteristics, operation, ratings, protections and thermal considerations. Brief introduction to power devices viz. TRIAC, MOS controlled thyristor (MCT), Power Integrated Circuit (PIC) (Smart Power), Triggering/Driver, commutation and snubber circuits for thyristor, power MOSFETs and IGBTs (discrete and IC based). Concept of fast recovery and schottky diodes as freewheeling and feedback diode.

UNIT-II

Controlled Rectifiers: Single phase: Study of semi and full bridge converters for R, RL, RLE and level loads. Analysis of load voltage and input current- Derivations of load form factor and ripple factor, Effect of source impedance, Input current Fourier series analysis of input current to derive input supply power factor, displacement factor and harmonic factor.

UNIT-III

Choppers: Quadrant operations of Type A, Type B, Type C, Type D and type E choppers, Control techniques for choppers – TRC and CLC, Detailed analysis of Type A chopper. Step up chopper. Multiphase Chopper

UNIT-IV

Single-phase inverters: Principle of operation of full bridge square wave, quasi-square wave, PWM inverters and comparison of their performance. Driver circuits for above inverters and mathematical analysis of output (Fourier series) voltage and harmonic control at output of inverter (Fourier analysis of output voltage). Filters at the output of inverters, Single phase current source inverter

UNIT-V

Switching Power Supplies: Analysis of fly back, forward converters for SMPS, Resonant converters - need, concept of soft switching, switching trajectory and SOAR, Load resonant converter - series loaded half bridge DC-DC converter.

Applications: Power line disturbances, EMI/EMC, power conditioners. Block diagram and configuration of UPS, salient features of UPS, selection of battery and charger ratings, sizing of UPS. Separately excited DC motor drive. P M Stepper motor Drive.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Build and test circuits using power devices such as SCR
2. Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters,
3. Learn how to analyze these inverters and some basic applications.
4. Design SMPS.

Text /Reference Books:

1. Muhammad H. Rashid, “Power electronics” Prentice Hall of India.
2. Ned Mohan, Robbins, “Power electronics”, edition III, John Wiley and sons.

3. V.R.Moorthi, “Power Electronics”, Oxford University Press.
4. Cyril W., Lander,” Power Electronics”, edition III, McGraw Hill.
5. G K Dubey, S R Doradla,: Thyristorised Power Controllers”, New Age International Publishers. SCR manual from GE, USA.

Effective from the session 2021-22
BET-P612
NANO ELECTRONICS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:
Students undergoing this course are exposed to: Know the types of nanotechnology, atomic structure, molecular technology and preparation of nano materials. Understand the fundamentals of nano electronics and its properties. Know the Silicon MOSFET's, QTD and carbon nano tubes. Understand the fundamentals of molecular electronics.

UNIT-I

Introduction to nanotechnology, meso structures, Basics of Quantum Mechanics: Schrodinger equation, Density of States.

UNIT-II

Particle in a box Concepts, Degeneracy. Band Theory of Solids. Kronig Penny Model. Brillouin Zones.

UNIT-III

Shrink-down approaches: Introduction, CMOS Scaling, The nanoscale MOSFET, Fin fets, Vertical MOSFETs, limits to scaling, system integration limits (interconnect issues etc.)

UNIT-IV

Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors. Carbon nanotube electronics, Band structure and transport, devices, applications,

UNIT-V

2D semiconductors and electronic devices, Graphene, atomistic simulation.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand various aspects of nano-technology and the processes involved in making nano components and material.
2. Leverage advantages of the nano-materials and appropriate use in solving practical problems.
3. Understand various aspects of nano-technology and the processes involved in making nano components and material.
4. Leverage advantages of the nano-materials and appropriate use in solving practical problems.

Text/ Reference Books:

1. G.W. Hanson, Fundamentals of Nano electronics, Pearson, 2009.
2. W. Ranier, Nano electronics and Information Technology (Advanced Electronic Material and Novel Devices), Wiley-VCH, 2003.
3. K.E. Drexler, Nano systems, Wiley, 1992.
4. J.H. Davies, The Physics of Low-Dimensional Semiconductors, Cambridge University Press, 1998.
5. C.P. Poole, F. J. Owens, Introduction to Nanotechnology, Wiley, 2003

Effective from the session 2021-22
BET-P613
PROBABILITY AND STOCHASTIC PROCESSES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:
The main objective of this course is to provide students with the foundations of probabilistic and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.

UNIT-I

Sets and set operations; Probability space; Conditional probability and Bayes theorem; Combinatorial probability and sampling models.

UNIT-II

Discrete random variables, probability mass function, probability distribution function, exampler and om variables and distributions; Continuous random variables, probability density function, probability distribution function, example distributions;

UNIT-III

Joint distributions, functions of one and two random variables, moments of random variables ; Conditional distribution, densities and moments; Characteristic functions of a random variable; Markov, Chebyshev and Chern off bounds.

UNIT-IV

Random sequences and modes of convergence (everywhere, almost everywhere, probability, distribution and mean square); Limit theorems; Strong and weak laws of large numbers, central
limit theorem.

UNIT-V

Random process. Stationary processes. Mean and covariance functions. Ergodicity. Transmission of random process through LTI. Power spectral density.

Course Outcomes:
At the end of this course students will demonstrate the ability to
1. Understand representation of random signals
2. Investigate characteristics of random processes
3. Make use of theorems related to random signals
4. To understand propagation of random signals in LTI systems.

Text/Reference Books:
1. H. Stark and J. Woods, ``Probability and Random Processes with Applications to Signal Processing," Third Edition, Pearson Education
2. A.Papoulis and S. Unnikrishnan Pillai, ``Probability, Random Variables and Stochastic Processes," Fourth Edition, McGraw Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability, UBS Publishers,
5. S. Ross, Introduction to Stochastic Models, Harcourt Asia, Academic Press.

Effective from the session 2021-22

BET-O630

INTELLECTUAL PROPERTY RIGHTS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

The course has following objectives:

1. Understanding and practicing the professional ethics for young engineers.
2. Understanding of patent law, and how patents are prosecuted and enforced.
3. Understanding of the importance of intellectual property laws in modern engineering and the related ethical considerations involved.

UNIT I

Engineering Ethics: Senses of 'Engineering Ethics'; variety of moral issues, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, Models of Professional Roles, theories about right action, Self-interest, customs and religion, uses of ethical theories.

UNIT II

Patents: Introduction to Patents, Patentable Subject Matter, Novelty, Non-Obviousness, The Patenting Process, Novelty, Infringement, & Searching, Patent Applications, Claim Drafting, Patent Prosecution, Design Patents, Business Method Patents, Foreign Patent Protection, Computer-Related Inventions, Patent Enforcement; Technical Design-Around.

UNIT III

Copyrights: Introduction to Copyright, Subject matter of Copyright, Rights of the owners of the copyright, Authorship – ownership & licensing and assignment of Copyrighted work, Registration of Copyright & Authorities, Copyrights for Technology Protection.

UNIT IV

Intellectual Property Rights: IP Law Overview, Mask Works, Trade Secrets, Trademarks, Engineers & Scientists as Expert Witnesses.

UNIT V

Enforcement of Intellectual Property Right: Infringement of intellectual property right, UNFAIR COMPETITION: relationship between unfair competition and intellectual property law. misappropriation right of publicity. false advertising.

Course Outcomes:

1. understand about the professional ethics,
2. understand the patent laws and importance of intellectual property laws in modern engineering.
3. Some important topics include: Senses of 'Engineering Ethics', Introduction to Patents, Subject matter of Copyright, IP Law Overview.

Text Books:

H B Rockman, Intellectual Property Law for Engineers and Scientists (1ed.), IEEE Press, 2004, ISBN st 978-0471449980.

Effective from the session 2021-22

INDUSTRIAL ELECTRICAL SYSTEMS

BEE-O631

MM: 100 **Sessional: 30**

Time: 3 Hr **ESE: 70**

L T P **Credit: 3**

3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
2. Understand various components of industrial electrical systems.

UNIT I

Electrical System Components LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current, Characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

UNIT II

Residential and Commercial Electrical Systems Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps,

UNIT III

Industrial Electrical Systems I HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthling design, Power factor correction kVAR calculations, type of compensation.

UNIT IV

Industrial Electrical Systems II Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components, DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

UNIT V

Industrial Electrical System Automation Study of basic PLC, Role of in automation, advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

1. The Student Analyze and selectthe proper size of various electrical system components
2. Will have knowledge of electrical wiring systems for residential, components of industrialelectrical systems.

Text Books:

1. S. L. Uppal and G. C. Garg, “Electrical Wiring, Estimating &Costing”, Khanna publishers, 2008.
2. K. B. Raina, “Electrical Design, Estimating & Costing”, New age International, 2007.
3. S. Singh and R. D. Singh, “Electrical estimating and costing”, Dhanpat Rai and Co., 1997.
4. H. Joshi, “Residential Commercial and Industrial Systems”, McGraw Hill Education, 2008.

Reference Books:

1. SoniA.Chakrabarti, M.L.Soni, P.V.Gupta, U.S.Bhatnagar, “AtextbookonPowerSystemEngineering”,KhannaPublishers,2000.
2. OpenShawTaylor,"UtilizationofElectricalEnergy", OrientedongmansLimite(RevisedinSIUnits),1971.
3. A.I.Starr, “Generation, Transmission and Utilization of Electric Power”, ELBS, 1978.

Batch 2019-2023 and onwards

Effective from the session 2021-22

SENSORS AND TRANSDUCERS

BEE-O632

MM: 100 **Sessional: 30**
Time: 3 Hr **ESE: 70**
L T P **Credit:**
3
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. Introduction of different sensors
2. Introduction of transducers
3. Telemetry & Data Acquisition System
4. Recent Trends and Developments

UNIT I

Sensor: Introduction of sensor, Definition, principle of sensing, its classification, Mechanical and Electromechanical Sensor: Strain gauge, Resistive Sensors: material, accuracy, sensitivity, Inductive sensor: common types, material, construction and input output variable, LVDT: Construction, material, output input relationship, I/O curve, Proximity Sensors.Capacitive sensors: Its type and calculation of sensitivity, ultrasonic sensors.

UNIT II

Sensor (Continue) Thermal sensors:Material expansion type: solid, liquid, gas & vapor, Resistance change type: RTD materials, Thermistor material, shape, ranges and accuracy specification, Junction semiconductor type IC and PTAT type, Pyroelectric type, Radiation sensor: types, characteristics and comparisons, Thermoemf sensor.Magnetic sensors: Sensor based on Villari effect for assessment of force, torque, proximity, Wiedemann effect for yoke coil sensors,Radiation sensors: LDR, Photovoltaic cells, photodiodes, photo emissive celltypes, materials, construction, response.Pneumatic Sensors, Light Sensors, Tactile Sensors, acoustic, optical sensors, and digital sensors.

UNIT III

Transducers-: Introduction, Classification of Transducers, Advantages and Disadvantages of Electrical Transducers, Transducers Actuating Mechanisms, Resistance Transducers, Variable Inductance Transducers, Strain gauges, Resistance thermometer, LVDT, RVDT, Capacitive, Piezoelectric Hall effect and opto-electronic transducers, Thermocouples, Thermoelectric Transducers, Photoelectric Transducers, Digital Transducers, Pyro-electric transducers and their applications. Measurement of motion, Force pressure, Temperature, Flow and liquid level.

UNIT IV

Telemetry & Data Acquisition System: General telemetry system, land line and radio frequency telemetering system, transmission channel and media, receiver and transmitter. Data Acquisition System, Various types of data acquisitionsystems, method of data transmission, Analog data acquisition system, Modern digital data acquisition system.

UNIT V

Display Devices and Recorders: Display devices, storage oscilloscope, spectrum analyzer, strip chart and X-Y recorders, magnetic tape and digital tape recorders.

Recent Trends and Developments: Computer aided measurements, fibre optic transducers, microprocessors, and smart. Recent trends in sensor technology, Introduction to smart sensors, basic building blocks of smart sensors, industrial applications of sensors.

Course Outcomes:

1. Understanding the classification of sensors
2. To understand the different transducers
3. Able to learn the Telemetry & Data Acquisition System
4. Able to learn Recent Trends and Developments with industrial applications

Text Books:

1. B. C. Nakara and K. Chaudhary, Instrumentation, measurement and analysis, Tata Mc Graw Hill 2nd Edition.
2. Curtis Johns, Process Control Instrumentation, Prentice Hall.
3. A.K. Sawhney, Advance measurement and instrumentation, Dhanpat Rai & Sons.
4. Murthy D. V. S, "Transducers and Instrumentation", Prentice Hall, New Delhi.
5. 2. Patranabis, "Sensors and Transducers", 2nd Edition, Prentice Hall India Pvt. Ltd.
6. 3. Doebelin E.O, "Measurement Systems - Application and Design", 4th Edition, McGraw-Hill, New York, 2003.

Reference Books:

1. Patranabis D, Sensors and Transducers, 2nd Edition, PHI, New Delhi, 2010.
2. John Turner and Martyn Hill, Instrumentation for Engineers and Scientists, Oxford Science Publications, 1999.
3. Richard Zurawski, Industrial Communication Technology Handbook 2nd edition, CRC Press, 2015.

Effective from the session 2021-22

BET-O633

DATA COMMUNICATION AND NETWORKS PROTOLS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVES:

1. To develop an understanding of modern network architectures from a design and performance perspective.
2. To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
3. To provide an opportunity to do network programming.
4. To provide a WLAN measurement ideas.

UNIT-I

Introduction : Computer Network & its uses, OSI reference model, TCP/IP Reference Model, ARPANET, Protocols, Routers, Switches, Hubs, Bridges and Repeaters, Introduction to LAN/MAN/WAN. The Physical Layer: Transmission media: Twisted pair, Baseband and Broadband coaxial cable, Fiber optics; Wireless Transmission: Radio transmission, Microwave transmission, Infrared and light wave transmission; ISDN: services and architecture, ALOHA

UNIT-II

The Data Link Layer: Design Issues: Services provided to other Layer, framing, Error control, Flow control; Error detection and Correction; Simplex, Sliding window protocol, Using Go-Back n, Stop & Wait Protocol ARQ.
The Medium Access Sub layer: Static and Dynamic Channel Allocation in LANs and MANs; IEEE standard 802.3, 802.4, 802.5; CSMA, Finite state machine model.

UNIT-III

The Network Layer: Network layer design issues, Shortest path routing, Flooding, flow- based routing, Broadcast routing, Congestion control and prevention policies; Traffic Shaping, Internetworking : connectionless Interworking, IP addressing, IPv4, Fragmentation, introduction to IPV-6.

UNIT-IV

The Transport Layer: QOS, The transport service; Transport protocols: Addressing, Establishing and releasing a connection; TCP/UDP header, Examples of transport layer.Session Layer-RPC, Synchronization, dialog management.

UNIT-V

The Application Layer: Network Security, FTP, SNMP, Telnet, E- mail, Multimedia, WWW, DNS, SMTP. Presentation layer: ASN, data compression, encryption.

Course Outcomes:

1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

References

1. Andrew S. Tanenbaum (3/e), Computer Networks, PHI
2. Frouzan , Data Communications & Networking(3/e, 4/e)
3. W.Stallings (5/e), Data and Computer Communications, PHI
4. Douglas E.Comer (3/e), Interworking with TCP/IP,Principles, Protocols & Architecture
5. D. Minoli, Internet & Intranet Engineering, TMH

Effective from the session 2021-22

BET-C661

EMBEDDED SYSTEMS LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1.Program to interface LCD data pins to port P1 and display a message on it.

2 .Program to interface keypad. Whenever a key is pressed, it should be displayed on LCD.

3.Program to interface seven segment display unit.

4.Program to interface LED display unit

5.Program to toggle all the bits of Port P1 continuously with 250 mS delay.

6.Program to toggle only the bit P1.5 continuously with some delay. Use Timer 0, mode 1 to create delay.

7.Program to interface ADC0808

8.program to clear 16 RAM locations starting at RAM address 60H

9. prgram to find the sum of the values 79H, F5H and E2H put the sum in registers R0 (low bytes) and R5(high bytes)

10. write a program to copy a block of 10 bytes of data from RAM locations , starting at 35H to RAM locations starting at 60H

NOTE

1.Minimum of 8 experiments have to be conducted.
2.The programs have to be tested on 8051/89C51 Development board/equivalent using Embedded C Language/Assembly Language on Keil IDE or Equivalent
3. In practical examination the student shall be required to perform one experiment.
4. A teacher shall be assigned 20 students for daily practical work in laboratory.
5. No batch for practical class shall consist of more than 20 students.
6. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
7. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2021-22
BET-C662
DIGITAL SIGNAL PROCESSING LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

To study the sampling & waveform Generation using bread board and kits.
2. To study the Quantization.
3. To study the PCM Encoding.
4. To study the delta modulation.
5. To study the digital modulation schemes (ASK, PSK, FSK).
6. To study the DFT Computation.
7. To study the Fast Fourier Transform.
8. To study the FIR filter implementation.
9. To study the IIR filter implementation.

NOTE
1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.
6. The programming to be done in mixed programming platform i.e. using Sci-Lab and Matlab.

Effective from the session 2021-22

BCE-C657

JAVA PROGRAMMING AND INTRODUCTION TO PYTHON LAB

MM : 50 **Sessional : 15**
Time : 2 hrs **ESE : 35**
L T P **Credits 1**
0 0 2

Write Following Programs in Java

● Classes and Objects: Programs to illustrate the concept of object and classes.
● Inheritance packages and interface: Programs to illustrate the concepts of Inheritance, packages and interfaces.
● Multithreading: programs to illustrate concepts of multithreading in Java.
● Overloading and Overriding : Programs to illustrate and build the concepts.
● Exception Handling: Programs to build concepts of exception handling.
● Python: Programs to introduce and familiarize the concepts of basics in python.
● Program to create a tuples, list dictionaries.

NOTE

1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in the laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with

CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
ACCORDING TO AICTE MODEL CURRICULUM
IN
B.TECH – IV YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

APPROVED BY
BOARD OF SYLLABUS
09 July 2021
(w.e.f. Batch 2019 and onwards)

FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKUL KANGRI VISHWAVIDYALAYA
HARIDWAR-249404

Website: www.gkv.ac.in

(Effective from the academic session 2022-23)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Fourth Year (SEMESTER-VII)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VII

DSC/SEC/ DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	Total			
THEORY										
BHU-S702	Industrial Economics and Business Administration	2	0	0	20	10	30	70	100	2
BET-C710	Microwave Theory and Technique	3	0	0	20	10	30	70	100	3
BET-C711	Wireless Communication	3	0	0	20	10	30	70	100	3
	Program Elective – II	3	0	0	20	10	30	70	100	3
	Open Elective – II	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								14
PRACTICAL										
BET-C761	Microwave Theory and Technique Lab	0	0	2	10	5	15	35	50	1
BET-C772	Minor Project	0	0	8	20	10	30	70	100	4
		TOTAL CREDITS								5
TOTAL		14	0	10	130	65	195	455	650	19

Program Elective Subject List

BCE-P730: Machine Learning-I
BET-P711: Fundamental of Radar and Navigation
BET-P712: Mixed Signal Design
BET-P713: Satellite Communication
BET-P714: Smart Antenna
BET-P715: Error Correcting Codes
BET-P716: Electromagnetic Metamaterials

Open Elective Subject List

BET-O710: Neural Network and Fuzzy Logic
BET-O711: Smart Sensors Technology
BEE-O730: Robotics Engineering
BEE-O731: Introduction to PLC and SCADA Systems

Effective from the session 2022-23
BHU-S702
INDUSTRIAL ECONOMICS AND BUSINESS ADMINISTRATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 2**
2 0 0

NOTE: The question paper shall consist of two sections (Sec.-Aand Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVESs:
1. To provide knowledge regarding the basic concepts, principles and functions of management.
2. To develop business and entrepreneurial aptitude among the students.
3. To provide knowledge and requisite skills in different areas of management like human resource, finance, operations and marketing to give a holistic understanding of a business system.

UNIT I

Industrial Economics: Elasticity of demand and supply, Demand forecasting methods, Consumption laws, Types of competition, Break even analysis, National income accounting, Trends in Industrialization in India, Economies of scale, Production Planning and control.

UNIT II

Money, Banking and Financial Management: Nature and functions of money, Functions of commercial and central banks, Credit creation in the banks, Balance of payment and trade, Foreign Exchange, Exchange control, Devaluation and Revaluation, Sources of Industrial Finance, Principles of accounting, Balance sheet & P & L A/C, Cash flow statement.

UNIT III

Principles of Management: Managerial functions - Planning, Organizing Leading & Controlling.

UNIT IV

Marketing Management: Concept of marketing management, P's of marketing, Product life cycle, Market segmentation.

UNIT V

Personnel Management and Industrial Psychology: Concept and importance of Personnel Management recruitment and selection, Training and development, Job evaluation, Fatigue, Accidents - causes and prevention, Nature of Industrial relations, Industrial disputes, Quality of work life.

Course Outcomes:

1. To familiarise the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession.
2. To give a good insight into contracts and contracts management in Electronics and Communication engineering, dispute resolution mechanisms; laws governing engagement of labour.
3. To give an understanding of Intellectual Property Rights, Patents.
4. To make the students understand the types of roles they are expected to play in the society as practitioners of their profession.
5. To develop good ideas of the legal and practical aspects of their profession.

References

1. Dewtt. K.K., Modern Economic Theory" S. Chand, & Co (r) Ltd (r) 1999.
2. Robbins (r) P. Stephen, Coutter Mary, 'Management' PHI 1998.
3. Kotler Philip, 'Marketing Management', PHI latest edition.
4. Nair N.G.,Latha Nair,Personnel Management and Industrial Relations', S.Chand &Co 1999.
5. Singh S.P. "Industrial Economics & Management" AITBS, New Delhi, 2006
6. Kooutsnnis, 'Modern Economic Theory', PHI, 1996.
7. Maheswari S.N., 'An Introduction to Accountancy' Vikas Publishing House 1999.
8. Koontz Harold, O Donnel Cyril, Weihirch Heniz, 'Management', TMH-1983.
9. Monoppan Arun, Sayadain S (r) Mirza, 'Personnel Management', TMH 1997 Edn.

Effective from the session 2022-23
BET-C710
MICROWAVE THEORY AND TECHNIQUE

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES: To build up the concept from basics of microwave communications to modern applications.

UNIT-I

Electromagnetic spectrum, Microwave frequency bands, Application areas of microwaves. Waveguides: TEM, TE and TM modes, Rectanglar waveguide, Cylindrical waveguide, excitation of waveguides, Resonators rectangular and cylindrical and their application, Quasi TEM mode and propagation in metamaterial structure, SIW Waveguide.

UNIT-II

Ferrites, Faraday rotation ferrite devices, isolators, Circulators, and phase shifters. Microwave components: S-parameters and their applications to Tee network, Magic Tee, Directional Couplers, Attenuators, Wave meters.

UNIT-III

Microwave Tubes: UHF limitation in conventional vacuum tubes, M-type and O-type tubes, Klystron Amplifier and Reflex Klystron, TWT Theory, characteristics parameters and applications, Backward wave oscialltor (BWO), and applications.

UNIT-IV

Magnetron, principle of operation, applications and characteristics parameters, mode jumping in magnetron.
Solid-state microwave devices: Varactor doade, PIN diode, Tunnel diode, V-I characteristics of T.D., T.D. amplifiers, and oscillator.

UNIT- V

Transferred electron devices, Gunn diode, Gunn Effect devices, Avalanche Transit time devices, Fundamental ideas of Microwave filters, Measurement of low and high microwave powers, Measurement of unknown impedance, wavelength measurements, VSWR measurements.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand various microwave system components their properties.
2. Appreciate that during analysis/ synthesis of microwave systems, the different mathematical treatment is required compared to general circuit analysis.
3. Design microwave systems for different practical application.

Text Book
Leo, Sanuer---Microwave & Solid state devices-Prentice Hall

Reference Books
1. Watson, H.A. ---Microwave Semiconductor Devices-McGraw Hill.
2. Collin, R.E. ---Fundamental of Microwave Engineering.

Effective from the session 2022-23
BET-C711
WIRELESS COMMUNICATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES: To expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards.

UNIT I

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication, examples of wireless communication: Paging System, Cordless telephone system, Cellular telephone system, Cellular concepts- Cell structure, frequency reuse, cell splitting, channel assignment, hand off, interference, capacity in cellular system, wireless standard 2G and 3G, Frequency reuse, Channel assignment strategies and Handoff strategies.

UNIT II

Signal propagation-Propagation mechanism- reflection, refraction, diffraction and scattering, large scale signal propagation and lognormal shadowing. Fading channels-Multipath and small scale fading- Doppler shift, statistical multipath channel models, narrowband and wide band fading models, power delay profile, average and rms delay spread, coherence bandwidth and coherence time, flat and frequency selective fading, slow and fast fading, average fade durationand level crossing rate.

UNIT III

Multi Path Fading in Mobile Radio Propagation: Factors influencing Small scale fading, Doppler Shift. Impulse response model of Multi path Channel, Fading effect due to multi path time delay spread, Fading effect due to Doppler spread. Diversity techniques: Time diversity, frequency diversity and polarization diversity. Receiver structure- Diversity receivers- selection and MRC receivers, RAKE receiver, equalization: linear-ZFE and adaptive, DFE. Transmit diversity-Altamonte scheme.

UNIT IV

Multiple Access Techniques: FDMA, TDMA, CDMA and SDMA, Spread spectrum Techniques: DSSS and FHSS, Processing gain, PN sequence generation and its properties. MIMO and space time signal processing, spatial multiplexing, diversity/multiplexing trade off. Performance measures- Outage, average snr, average symbol/bit error rate. System examples- GSM, EDGE, GPRS, IS-95, CDMA 2000 and WCDMA, 4G and 5G .

UNIT V

Global System for Mobile (GSM): GSM Services and Features, GSM System Architecture, GSM Radio Subsystems, GSM Channel types: Traffic channels, Control Channels, Frame structure in GSM, Signal Processing in GSM. Introduction to mobile wireless antennas.

Course Outcomes:

At the end of the course, students will demonstrate the ability to:
1. Understand the working principles of the mobile communication systems.
2. Understand the relation between the user features and underlying technology.
3. Analyze mobile communication systems for improved performance.

Text Book

T.S. Rappaport, Wireless Communication, PHI, 2002

References

1. W.C.Y. Lee, Mobile Communication engineering, McGraw Hill, 1997.
2. K.O. Feher, Wireless Digital Communication, Prentice Hall, 1995.
3. Raj Pandya, Mobile and Personal Communication Services and Systems, PHI, 2001
4. Raymond Steele, Mobile Radio Communications, IEEE Press, New York, 1992.

Batch 2019-2023 and onwards

Effective from the session 2022-23
BCE-P730
MACHINE LEARNING-I

MM: 100 **Sessional: 30**
Time: 3 hrs **ESE: 70**
L T P **Credits 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:

1. To understand the basic building blocks and general principles that allow one to design machine learning algorithms.
2. To become familiar with specific, widely used machine learning algorithms
3. To learn methodology and tools to apply machine learning algorithms to real data and evaluate their performance

UNIT-I

Introduction to Machine Learning, Difference between Artificial Intelligence (AI), Machine Learning (ML) and Deep Learning (DL), Applications of Machine Learning, Limitations or need for applying ML algorithms, Types of Machine Learning and their use cases, Types of problem – Regression and Classification, Types of data – Structured Data and Unstructured Data. Batch and online learning.

UNIT- II

Tools required for machine learning- Python Libraries (Numpy, Pandas, Matplotlib etc), Framework for machine learning algorithm (Scikit-learn, Tensor Flow, Keras, Anaconda, Google Colab etc), Popular ML Datasets (MNIST Dataset, IRIS Dataset, Wine quality dataset, ImageNet, IMDB reviews, Recommender Systems Dataset etc), Data repositories sources for machine learning practices (UCI Machine learning repository, Kaggle, Wikipedia, CMU, Google Dataset Search, The Big Bad NLP Database etc).

UNIT – III

Basic concept of Probability theory and Linear Algebra, Bias, Variance, Bias-Variance trade-off, overfitting and under fitting. Pre-processing of data - Data cleaning, wrangling and filtering, Handling missing and categorical data, Data scaling, Feature extraction and selection, covariance matrix, Dimensionality Reduction, Train-Test splitting strategy, Training Set, Validation Set, Test Set, Importance of cross validation – Holdout Method and K-fold cross validation.

UNIT- IV

Introduction to performance metrics for Machine Learning Algorithm – Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Confusion Matrix, Classification Accuracy, Classification Report (Precision, Recall/Sensitivity, Specificity, F1-Score, Area Under ROC curve). Fine tuning of model – Grid Search, Randomized Search, Ensemble Method. Concept of Bagging.

UNIT – V

Introduction to regression problems, Types of regression – Linear Regression, Logistic Regression, Ridge Regression, Lasso Regression, Polynomial Regression. Introduction to classification problems and Types of classification - Binary Classification, Multi-Class Classification, Multi-Label Classification, Imbalanced Classification. Introduction to reinforcement learning and types - Model-Free and Model-Based RL.

Course Outcome:

1. Ability to implement and apply machine learning algorithms to real-world applications.
2. Ability to identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems.
3. Ability to understand how to perform evaluation of learning algorithms and model selection

TEXT BOOKS:

1. Introduction to Machine Learning, Alpaydin, E., MIT Press, 2004.
2. Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Müller and Sarah Guido, O'Reilly, 2016.

SUGGESTED READINGS:

1. Elements of Machine Learning, Pat Langley Morgan Kaufmann Publishers, Inc. 1995.

2. The elements of statistical learning, Friedman, Springer series in statistics, 2001.
3. The Hundred-page Machine Learning Book, Andriy Burkov, 2019
4. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Aurelien Geron, O'Reilly, 2017.

Effective from the session 2022-23
BET-P711
FUNDAMENTAL OF RADAR AND NAVIGATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:
1. To introduce the fundamental concepts of RADAR (Radio Detection and Ranging) and Navigational aids.
2. To expose the students to different types of RADAR systems and Navigation.

UNIT I

Radar Signal Models: Amplitude models, distributed target forms of range equation, radar cross section, statistical description of radar cross section, Clutter, signal to clutter ratio, temporal and spatial correlation of clutter, noise model and signal to noise ratio, frequency models, Doppler shift, simplifies approach to Doppler shift, stop and hop assumption, variation with angle, variation with range, projections, multipath.

UNIT II

Radar Wave Forms: Waveform matched filter of moving targets, ambiguity function, ambiguity function of the simple matched pulse filter for the pulse burst, pulse by pulse processing, range ambiguity, Doppler response and ambiguity function of the pulse burst.

UNIT III

Detection Fundamentals: Radar detection as hypothesis testing, Neyman-Pearson detection rule, likelihood ratio test, threshold detection of radar signals, non-coherent integration of non-fluctuating targets, Albersheim and Shnidaman equations, Binary integration.

UNIT IV

Radio Direction Finding: loop direction finder, goniometer, errors in direction finding, adcock and automatic direction finders, commutated aerial direction finder.
Radio Ranges: LF/MF four course radio range, VOR, ground equipment & receiver, VOR errors.
Hyberbolic System of Navigation: LORAN Decca & Omega system. DME & TECAN

UNIT V

Aids to Approach and Landing: ILS, GCA & MLS
Doppler Navigation: Beam configuration, doppler frequency equation, track stabilisation and doppler spectrum, components of doppler navigation system, doppler radar equipment, CW & FMCW Doppler radar, frequency trackers, doppler range equation. Radar applications in defense systems.

Course Outcomes:
1. Knowledge in the topics such as Fundamentals of Radar .
2. To become familiar with fundamentals of Different types of RADAR
3. To gain in-depth knowledge about the different types of RADAR and their operations .
4. Understand signal detection in RADAR and various detection techniques
5. Understand Navigational Aids and Modern Navigation

Text Book:
Fundamentals of radar signal processing Mark A Richards, TMH.
Reference Books:
1. Elements of Electronics Navigation, N. S. Nagraja, TMH.
2. Radar principles, Peebles Jr. P. Z., Wiley, NY.
3. S Kolnik, M.L-Introdution to Radar Systems-McGraw Hill.1980.

Effective from the session 2022-23
BET-P712
MIXED SIGNAL DESIGN

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVESs:
The course deals with the theory and design skills of CMOS op-amps, voltage reference circuits, switched capacitor circuits, sample-and- hold circuits, and A/D & D/A converters used in modern communication systems and consumer electronic products.

UNIT I

Analog and discrete-time signal processing, introduction to sampling theory; Analog continuous time filters: passive and active filters; Basics of analog discrete-time filters and Z-transform.

UNIT II

Switched-capacitor filters- Non ideal ties in switched-capacitor filters; Switched-capacitor filter architectures; Switched-capacitor filter applications.

UNIT III

Basics of data converters; Successive approximation ADCs, Dual slope ADCs, Flash ADCs, Pipeline ADCs, Hybrid ADC structures, High-resolution ADCs, DACs.

UNIT IV

Mixed-signal layout, Interconnects and data transmission; Voltage-mode signalling and data transmission; Current-mode signalling and data transmission.

UNIT V

Introduction to frequency synthesizers and synchronization; Basics of PLL, Analog PLLs; Digital PLLs; DLLs.

Course Outcomes:
At the end of the course, students will demonstrate the ability to:
1. Understand the practical situations where mixed signal analysis is required.
2. Analyze and handle the inter-conversions between signals.
3. Design systems involving mixed signals

Text/Reference Books:
1. R. Jacob Baker, CMOS mixed-signal circuit design, Wiley India, IEEE press, reprint 2008.
2. Behzad Razavi , Design of analog CMOS integrated circuits, McGraw-Hill, 2003.
3. R. Jacob Baker, CMOS circuit design, layout and simulation, Revised second edition, IEEE press, 2008.
4. Rudy V. dePlassche, CMOS Integrated ADCs and DACs, Springer, Indian edition, 2005.
5. Arthur B. Williams, Electronic Filter Design Handbook, McGraw-Hill, 1981.
6. R. Schauman, Design of analog filters by, Prentice-Hall 1990 (or newer additions).
7. M. Burns et al., An introduction to mixed-signal IC test and measurement by, Oxford university press, first Indian edition, 2008.

Effective from the session 2022-23
BET-O710
NEURAL NETWORK AND FUZZY LOGIC

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVES:

The objective of this course is to enable students to Solve problems that are appropriately solved by neural networks, fuzzy logic. Understand basic knowledge of fuzzy sets and fuzzy logic. Apply basic fuzzy inference and approximate reasoning.

UNIT I

NEURAL NETWORKS-1(INTRODUCTION & ARCHITECTURE): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks, various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory.

UNIT II

NEURAL NETWORKS-II (BACK PROPAGATION NETWORKS): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient; back propagation algorithm, factors affecting back propagation training, applications.

UNIT III

FUZZY LOGIC-I (INTRODUCTION): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory versus probability theory, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. (8)

UNIT IV

FUZZY LOGIC II (FUZZY MEMBERSHIP, RULES): Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzy fications & De fuzzifications, Fuzzy Controller.

UNIT V

APPLICATION OF NEURAL NETWORK AND FUZZY LOGIC: Application of neural network, case study, Inverted pendulum, Image processing, introduction to neuro & fuzzy logic controller.

Course Outcomes:

1. Understand the basics of neural network.
2. Understand the basics of fuzzy logic.
3. Understand and analyze application of neural network and fuzzy logic.

BOOKS:

1. Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publishing home.
2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, John Wiley.

Effective from the session 2022-23
BET-P713
SATELLITE COMMUNICATION

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVES:
To introduce various aspects in the design of systems for satellite communication

UNIT I

Elements of Satellite Communication, Orbital mechanics, look angle and orbit determination, launches & launch vehicle, orbital effects, Geostationary Orbit.

UNIT II

Satellite subsystems, attitude and orbit control systems, TTC&M, communication subsystem, satellite antenna, satellite link design: basic transmission theory, system noise temperature and G/T ratio, downlink design, uplink design, satellite systems using small earth station, design for specified C/N.

UNIT III

Modulation and multiplexing techniques for satellite links: FM, pre-emphasis and de-emphasis, S/N ratios for FM video transmission, digital transmission, digital modulation and demodulation, TDM. Multiple access: FDMA, TDMA, DAMA and CDMA.

UNIT IV

Error control for digital satellite links: error detection and correction, channel capacity, error control coding, convolutional codes, linear and cyclic block codes. Propagation effects and their impact on satellite-earth links: attenuation and depolarization, atmospheric absorption, rain, cloud and ice effects etc.

UNIT V

Introduction of various satellite systems: VSAT, low earth orbit and non-geostationary, direct broadcast satellite television and radio, satellite navigation and the global positioning systems. Pseudo-satellite, brief about satellite pay loads.

Course Outcomes:

1. Able to learn the dynamics of the satellite.
2. Able to understand the communication satellite design.
3. Able to understand how analog and digital technologies are used for satellite communication networks.
4. Able to learn the design of satellite links.
5. Able to study the design of Earth station and tracking of the satellites.

Text / Reference Books

1. Satellite Communications / Pratt, Bostian, Allnutt / John Wiley & Sons.
2. Satellite Communications / Dennis Roddy / McGraw-Hill
3. Digital Satellite Communications/ Tri T. Ha./ McGraw-Hill.

Effective from the session 2022-23
BET-P714
SMART ANTENNAS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

COURSE OBJECTIVES:

To gain an understanding and experience with smart antenna environments, algorithms and implementation.

UNIT I

Introduction to Smart Antennas: Spatial Processing for Wireless Systems, Key Benefits of Smart Antennas, Smart antenna introduction, smart antenna configuration, SDMA, architecture of smart antenna systems. Beam forming networks.

UNIT II

Smart antenna systems: The Vector Channel Impulse Response and the Spatial Signature, Spatial Processing Receivers, Fixed Beam forming Networks, Switched Beam Systems, Adaptive Antenna Systems, Wideband Smart Antennas, Spatial Diversity, Diversity Combining, and Sectoring, Digital Radio Receiver Techniques and Software Radios for Smart Antennas, Transmission Beam forming.

UNIT III

Smart Antennas Techniques for CDMA: Non-Coherent CDMA Spatial Processors, Coherent CDMA Spatial Processors and the Spatial Processing Rake Receiver, Multi-User Spatial Processing, Dynamic Re-sectoring Using Smart Antennas, Downlink Beam forming for CDMA.

UNIT IV

Spatio temporal channel models. Environment and signal parameters. Geometrically based single bounce elliptical model. Optimal spatial filtering – adaptive algorithms for CDMA. Multitarget decision – directed algorithm. DOA estimation – conventional and subspace methods.

UNIT V

MIMO: Introduction, SISO channel, N-parallel transmission lines, SIMO channel, Rayleigh faded matrix channel.

Course Outcome:

1. Understand antenna theory and application of signal processing in it.
2. Learn techniques of developing MIMO antennas, beam forming.
3. Design practical antennas for Radar applications.

Text/Reference Books:

1. T.S.Rappaport & J.C.Liberti, Smart Antennas for Wireless Communication, Prentice Hall (PTR) ,1999.
2. R.Janaswamy, Radio Wave Propagation and Smart Antennas for Wireless Communication, Kluwer,2001.
3. C.A.Balanis,"Antenna Theory and Design", 3 rd Ed., John Wiley & Sons., 2005.
4. W. L.Stutzman, and G.A. Thiele,"Antenna Theory and Design", 2 nd Ed., John Wiley & Sons., 1998.

Effective from the session 2022-23
BET-P715
ERROR CORRECTING CODES

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:
To explain the importance of modern coding techniques in the design of digital communication systems.

UNIT I
Review of modern algebra. Galois fields Linear block codes: encoding and decoding Systematic linear codes and optimum decoding for the binary symmetric channel; Generator and Parity Check matrices, Syndrome decoding on symmetric channels; Hamming codes; Cyclic codes. Non- binary codes

UNIT II
Convolutional codes. Generator sequences. Structural properties. ML decoding. Viterbi decoding. Sequential decoding.

UNIT III
Modulation codes. Trellis coded modulation. Lattice type Trellis codes. Geometrically uniform trellis codes. Decoding of modulation codes.

UNIT IV
Turbo codes. Turbo decoder. Interleaver. Turbo decoder. MAP and log MAP decoders. Iterative turbo decoding. Optimum decoding of turbo codes.

UNIT V
Space-time codes. MIMO systems. Space-time codes. MIMO systems. Space-time block codes (STBC) –decoding of STBC.

Course Outcome:

1. Understand the need for error correcting codes in data communication and storage systems.
2. Identify the major classes of error detecting and error correcting codes and how they are used in practice.
3. Explain the operating principles of block codes, cyclic codes, convolution codes, modulation codes, Turbo codes etc.
4. Develop and execute encoding and decoding algorithms associated with the major classes of error detecting and error correcting codes.

Text/Reference Books:

1. S.Lin & D.J.Costello, “Error Control Coding (2/e)”, Pearson, 2005.
2. B.Vucetic & J.Yuan, “Turbo codes”, Kluwer, 2000
3. F.J. McWilliams and N.J.A. Slone, The theory of error correcting codes, 1977.
4. R.E. Balahut, Theory and practice of error control codes, Addison Wesley, 1983.

Batch 2019-2023 and onwards

Effective from the session 2022-23
BET-P716
ELECTROMAGNETIC METAMATERIALS

MM : 100 **Sessional : 30**
Time : 3 Hr **ESE : 70**
L T P **Credit : 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

COURSE OBJECTIVES:
To understand the principles of Metamaterials and use the same in the design of Metamaterial components for the usage at high frequencies.

UNIT I
Introduction - Definition of Metamaterials (MTMs) and Left-Handed (LH) MTMs - Theoretical Speculation by Viktor Veselago - Experimental Demonstration of Left-Handedness - "Conventional" Backward Waves and Novelty of LH MTMs -Terminology - Transmission Line (TL) Approach - Composite Right/Left- Handed (CRLH) MTMs -MTMs and Photonic Band-Gap (PBG) Structures. - Left-Handedness from Maxwell's Equations - Boundary Conditions - Reversal of Doppler Effect - Reversal of Vavilov- Cerenkov Radiation - Reversal of Snell's Law: Negative Refraction.

UNIT II
TL Theory of MTMs - Ideal Homogeneous CRLH TLs: Fundamental TL Characteristics - Equivalent MTM Constitutive Parameters - Balanced and Unbalanced Resonances - Lossy Case; LC Network Implementation: Principle - Difference with Conventional Filters - Transmission Matrix Analysis - Input Impedance - Cut-off Frequencies - Real Distributed 1D CRLH Structures: General Design Guidelines - Micro strip Implementation - Parameters Extraction - Experimental Transmission Characteristics - Conversion from Transmission Line to Constitutive Parameters.

UNIT III
Two-Dimensional MTMs - Principle of the TMM - Scattering Parameters - Voltage and Current Distributions - Interest and Limitations of the TMM; Transmission Line Matrix (TLM) Modelling Method: TLM Modelling of the Unloaded TL Host Network - TLM Modelling of the Loaded TL Host Network (CRLH) - Relationship between Material Properties and the TLM Model Parameters -Suitability of the TLM Approach for MTMs; Negative Refractive Index (NRI) Effects: Negative Phase Velocity - Negative Refraction - Negative Focusing.

UNIT IV
Guided-Wave Applications - Dual-Band Components: Dual-Band Property of CRLH TLs - Quarter- Wavelength TL and Stubs - Passive Component Examples: Quadrature Hybrid and Wilkinson Power Divider - Enhanced-Bandwidth Components: Principle of Bandwidth Enhancement - Rat-Race Coupler Example.

UNIT V
Tight Edge-Coupled Coupled-Line Couplers (CLCs): Generalities on Coupled-Line Couplers - TEM and Quasi-TEM Symmetric Coupled-Line Structures with Small Interspacing: Impedance Coupling (IC) - Non- TEM Symmetric Coupled-Line Structures with Relatively Large Spacing: Phase Coupling (PC) - Summary on Symmetric Coupled-Line Structures - Asymmetric Coupled-Line Structures -Advantages of MTM Couplers - Symmetric Impedance Coupler - Radiated-Wave Applications and examples - Uniform and Periodic Leaky-Wave Structures - "Real-Artificial" Materials: the Challenge of Homogenization – Special Topics of Interest.

Course Outcome: Student will learn
1. Learn and understand the principles of Metamaterials.
2. Understand the theory of Transmission line theory of Metamaterials.
3. Learn the applications of and Principles of two dimensional MTMs.
4. Learn the principles of Guided Wave Applications of MTMs.
5. Learn the principles coupling theory and its applications in MTMs.

Text Book:
1. Christophe Caloz, Tatsuo Itoh, Electromagnetic Metamaterials: Transmission Line Theory and Microwave Applications" by John Wiley & Sons, Inc., Hoboken, New Jersey, 2006.

Batch 2019-2023 and onwards

Effective from the session 2022-23
BEE-O731
INTRODUCTION TO PLC AND SCADA SYSTEMS

MM: 100 **Sessional: 30**
Time: 3 Hr **ESE: 70**
L T P **Credit: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- The objective of the course is to provide the Introduction of Automation system, PLC and I/O processing, Programming of PLC, PLC interface to various circuits, SCADA Systems

UNIT I

Introduction of Automation system: Introduction to Industrial Automation, Requirement of automation systems, Application areas, Architecture of Industrial Automation system, Introduction of PLC and supervisory control and data acquisition (SCADA). Industrial communication protocols: modbus & profibus.

UNIT II

PLC and I/O processing: Programmable Logic Controller basics, overview of PLC systems – Architecture of PLC, Principle of Operation, input/output Units – power supplies and isolators, current sinking and current sourcing, types of PLC memory, fundamental PLC wiring diagram, relays, switches, transducers, sensors –seal-in circuits. Input/output units Signal conditioning. Remote connections Networks Processing inputs I/O addresses.

UNIT III

Programming of PLC: Fundamentals of logic, PLC programming languages. Ladder diagrams, Ladder Diagram Instruction, Logic functions, Latching, Multiple outputs. Timer and counter- types along with timing diagrams, shift registers, sequencer function, latch instruction; Arithmetic and logical instruction with various examples. ON/OFF switching devices, I/O analog devices, Analog PLC operation, PID control of continuous processes, simple closed loop systems, closed loop system using Proportional, Integral & Derivative (PID), PLC interface, and Industrial process example.

UNITIV

PLC interface to various circuits: Encoders, transducer and advanced sensors. Measurement of temperature, flow, pressure, force, displacement, speed, level. Developing a ladder logic for Sequencing of motors, Tank level control, ON-OFF temperature control, elevator, bottle filling plant, car parking etc. Motors Controls: AC Motor starter, AC motor overload protection, DC motor controller, Variable speed (Variable Frequency) AC motor Drive.

UNITV

SCADA Systems: Introduction, Communication requirements, Desirable Properties of SCADA system, features, advantages, disadvantages and applications of SCADA. SCADA Architectures (First generation - Monolithic, second generation - Distributed, Third generation – Networked Architecture), SCADA systems in operation and control of interconnected power system, Power System Automation (Automatic substation control and power distribution). Open systems interconnection (OSI) Model, Process Field bus (Profibus). Interfacing of SCADA with PLC.

Course Outcomes:

- Learn the Introduction of Automation system.
- PLC and I/O processing.
- Programming of PLC
- PLC interface to various circuits SCADA Systems

Text Books:

1. Gary Dunning, "Introduction to Programmable Logic Controllers", Thomson, 2nd Edition.
2. John R. Hackworth, Frederick D., Hackworth Jr., "Programmable Logic Controllers Programming Methods and Applications", PHI Publishers.
3. John W. Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", PHI Learning, New Delhi, 5th Edition.
4. Stuart A Boyer, "SCADA supervisory control and data acquisition", ISA, 4th Revised edition.
5. L.A. Bryan, E. A. Bryan, "Programmable Controllers Theory and Implementation" Industrial Text Company Publication, Second Edition.
6. Industrial Instrumentation and Control, by Singh, McGraw Hill.

Reference Books:

1. Stuart A. Boyer: "SCADA- Supervisory Control and Data Acquisition", Instrument Society of America Publications, USA, The Instrumentation system and Automation Society, 4th Edition, 2010.
2. Gordon Clarke, Deon Reynders" Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems", Newnes an imprint of Elsevier Publications, 1st Edition, 2004
3. Batten G. L., "Programmable Controllers", McGraw Hill Inc., Second Edition.
4. Gordan Clark, Deem Reynders, "Practical Modern SCADA Protocols", ELSEVIER
5. P. K. Srivstava, "Programmable Logic Controllers with Applications", BPB Publications.

Batch 2019-2023 and onwards

Effective from the session 2022-23
BEE-O730
ROBOTICS ENGINEERING

MM: 100 **Sessional: 30**
Time: 3 Hr **ESE: 70**
L T P **Credit: 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

- To understand the importance of robotics in scientific and industrial domains
- To introduce mathematical aspects of robotics such as spatial transformations, kinematics, dynamics, trajectory generation, actuators and control

UNIT I

Introduction: Basic terminology- Accuracy, Repeatability, Resolution, Degree of freedom. Mechanisms and transmission, End effectors, Grippers-different methods of gripping, Mechanical Grippers-Slider crank mechanism, Screw type, Rotary actuators, Cam type gripper, Magnetic grippers, Vacuum grippers, Air operated grippers; Specifications of robot.

UNIT II

Drive systems and Sensors: Drive system- hydraulic, pneumatic and electric systems, Sensors in robot – Touch sensors, Tactile sensor, Proximity and range sensors, Robotic vision sensor, Force sensor, Light sensors, Pressure sensors.

UNIT III

Kinematics and Dynamics of Robots: 2D, 3D Transformation, Scaling, Rotation, Translation, Homogeneous coordinates, multiple transformation, Simple problems. Matrix representation, Forward and Reverse Kinematics of Three Degree of Freedom, Homogeneous Transformations, Inverse kinematics of Robot, Robot Arm dynamics, D-H representation of robots, Basics of Trajectory Planning.

UNIT IV

Robot Control, Programming and Applications: Control actions, Feedback devices, Encoder, Resolver, LVDT, Motion Interpolations, Adaptive control, Introduction to Robotic Programming, On-line and off-line programming, programming examples. Robot applications-Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting.

UNIT V

Introduction of Mobile Robotics, Mechanics and Locomotion: A brief history of mobile robotics, Recent advances in the mobile robotics for RISE (Risky Intervention and Surveillance Environment) applications, Locomotion, Key issues in locomotion, legged, wheeled and aerial mobile robots.

Mobile Robot Kinematics: Introduction, kinematic models and constrains, mobile robot workspace, beyond basic kinematics, motion control (kinematic control).

Courses Outcomes:

- Understand the basic terminology used in introducing robotics.
- Understand the 2-D and 3-D transformation and basic trajectory planning.
- Understand the programming and controlling of robots with applications.
- Understand the new development and trending concept of mobile robotics.

Text Books:

1. Bruno S and Sciavicco L, Robotics: Modelling, Planning and Control, Springer (2009).
2. John J C, Introduction to Robotics: Mechanics and Control, Addison-Wesley (1989).
3. Fu K S, Ralph G and Lee C S G, Robotics: Control Sensing. Vision, and Intelligence, Tata McGraw-Hill (1987).
4. Mukhopadhyay S, Sen S and Deb A K, Industrial Instrumentation, Control and Automation, Jaico (1999).

5. Rajkumar B and Dastjerdi A V, Internet of Things: Principles and Paradigms, Morgan Kaufmann (2016).

Reference Books:

1. R M Murray, Z. Li and SS Sastry, "A Mathematical Introduction to Robotic Manipulation", CRC Press, 1994.
2. J J Craig, "Introduction to Robotics: Mechanics and Control", Prentice Hall, 2004.
3. J J E Slotine and W Li, "Applied Nonlinear Control", Prentice Hall, 1991.
4. Sebastian Thrun, Wolfram Burgard, Dieter Fox, "Probabilistic Robotics", MIT Press, 2005. 5. Carlos, Bruno, Georges Bastin, "Theory of Robot Control", Springer, 2012.

Effective from the session 2022-23
BET-O711
SMART SENSOR TECHNOLOGY

MM : 100 **Sessional : 30**
Time : 3 hrs **ESE : 70**
L T P **Credits 3**
3 0 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

UNIT – I

BASICS OF SMART SENSORS & MICROMACHINING: Introduction, Mechanical-Electronic transitions in sensing, nature of sensors, overview of smart sensing and control systems, integration of micromachining and microelectronics, introduction to micromachining, bulk micromachining, wafer bonding, surface micromachining, other micromachining techniques.

UNIT - II

SENSOR INFORMATION TO MCU: Introduction, amplification and signal conditioning, separate versus integrated signal conditioning, digital conversion.

UNIT - III

MCUS AND DSPS TO INCREASE SENSOR IQ: Introduction, MCU control, MCUs for sensor interface, DSP control, Software, tools and support, sensor integration. CONTROL TECHNIQUES: Introduction, state machines, fuzzy logic, neural networks, combined fuzzy logic and neural networks, adaptive control, other control areas. SENSOR COMMUNICATION & MEMS: Wireless zone sensing, surface acoustical wave devices, intelligent transportation system, RF-ID, Microoptics, microgrippers, microprobes, micromirrors, FEDs.

UNIT - IV

COMMUNICATIONS FOR SMART SENSORS : Introduction, definitions and background, sources and standards, automotive protocols, industrial networks, office & building automation, home automation, protocols in silicon, other aspects of network communications.

UNIT – V

PACKAGING, TESTING AND RELIABILITY OF SMART SENSORS: Introduction, Semiconductor packaging applied to sensors, hybrid packaging, packaging for monolithic sensors, reliability implications, testing smart sensors. Unit Standards for Smart Sensors: Introduction, setting the standards for smart sensors and systems, IEEE 1451.1, IEEE 1451.2, IEEE P1451.3, IEEE 1451.4, extending the systems to network.

TEXT BOOKS:

1. Smart Sensors and Sensing Technology, Daniel E. Suarez,Nova Science Publishers

Effective from the session 2022-23
BET-C761
MICROWAVE THEORY AND TECHNIQUE LAB

MM : 100 **Sessional : 15**
Time : 2Hr **ESE : 35**
L T P **Credit : 1**
0 0 2

LIST OF EXPERIMENT:

1. Study of characteristics of Klystron tube and to determine its electronic tuning range.
2. To determine the frequency & wavelength in a rectangular wave-guide working on
3. TE10 mode.
4. To determine the Standing Wave Ratio, Reflection Coefficient.
5. To measure an unknown Impedance with Smith chart.
6. To study V-I characteristics of Gunn Diode.
7. To measure the polar pattern and the gain of wave-guide horn antenna.
8. Study the function of multi hole directional coupler by measuring the following parameters:
   - **(a)** Main-line and Auxiliary-line VSWR.
   - **(b)** Coupling factor and Directivity.
9. Study of Magic Tee.
10. Setting up a Fiber Optic Analog Link.
11. Setting up a Fibre Optic Digital Link.
12. Measurement of Numerical Aperture.
13. Study of Electromagnetic/Radio Frequency Interference.
14. Simulation using HFSS
15. Introduction to biological interaction with RF or microwave signals using HFSS or some other software.

NOTE
1. In practical examination the student shall be required to perform one experiment.
2. A teacher shall be assigned 20 students for daily practical work in laboratory.
3. No batch for practical class shall consist of more than 20 students.
4. The number of students in a batch allotted to an examiner for practical examination shall not exceed 20 students.
5. Addition/deletion in above list may be made in accordance with the facilities available with the approval of H.O.D./Dean.

Effective from the session 2022-23
BET-C772
MINOR PROJECT

MM : 100 **ESE: 70**
Credit : 4 **Sessional : 30**

OBJECTIVE: The object of Minor Project Work is to enable the student to take up investigative study in the broad field of Electronics & Communication Engineering, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the Department on an individual basis or two/three students in a group, under the guidance of a Supervisor. This is expected to provide a good initiation for the student(s) in R&D work. The assignment to normally include:

1. Survey and study of published literature on the assigned topic;
2. Working out a preliminary Approach to the Problem relating to the assigned topic;
3. Conducting preliminary Analysis/Modelling/Simulation/Experiment/Design/Feasibility;
4. Preparing a Written Report on the Study conducted for presentation to the Department;
5. Final Seminar, as oral Presentation before a departmental committee.

INSTRUCTIONS FOR STUDENTS: Each student shall be assigned a Minor Project by departmental committee. The student shall be required to perform his project work under the supervision of the supervisor(s). There shall be a seminar on the project work of the student to be evaluated by a departmental committee chaired by H.O.D. The student shall be required to submit his project report in the form of dissertation 15 days before the end of VII semester. The student shall be required to submit three copies of the project work with certificate from the supervisor(s) that the work is authentic record of the work performed by him. The report shall be forwarded by H.O.D. The report of the project work shall be evaluated by the external examiner(s). The same external examiner(s) shall hold the viva-voce examination.

THE DISTRIBUTION OF MARKS FOR THE MINOR PROJECT SHALL BE AS FOLLOWS:

MINOR PROJECT	
Project**	50
Viva-voce/Presentation**	20
Seminar (Internal)***	30
Total	100

** - Marks for the project work shall be awarded jointly by the external and internal examiners after viva-voce examination.

*** - There shall be a seminar on the project work of the student to be evaluated by the departmental committee chaired by H.O.D.

(Effective from the academic session 2022-23)

GURUKULA KANGRI VISHWAVIDYALAYA, HARIDWAR

Faculty of Engineering & Technology

Electronics & Communication Engineering

B. Tech. Fourth Year (SEMESTER-VIII)

Syllabus in accordance with AICTE Model Curriculum

SEMESTER-VIII

DSC/SEC/ DSE/AEC	SUBJECT	PERIODS			EVALUATION SCHEME				Subject Total	Credits
					SESSIONAL EVALUATION			EXAM ESE		
		L	T	P	CT	TA	TOTAL			
THEORY										
	MOOC- I	3	0	0	20	10	30	70	100	3
	MOOC- II	3	0	0	20	10	30	70	100	3
	MOOC- III	3	0	0	20	10	30	70	100	3
	MOOC- IV	3	0	0	20	10	30	70	100	3
		TOTAL CREDITS								12
PRACTICAL										
BET-C862	Major Project	0	0	16	0	100	100	300	400	8
		TOTAL CREDITS								8
TOTAL		12	0	16	80	140	220	580	800	20

List of MOOC courses shall be decided by the departmental committee in each semester depending upon the list from SWAYAM/NPTEL and other recognized online platforms. Students have to study from Online Platform doubt sessions shall be held by Internal teachers and exams shall be taken by university. If a student wishes he can give exam of Online Platform for certification. SWAYAM courses to run every year from July onwards (Odd Semester) are declared in the month of May and for courses to run every year from January onwards (Even Semester) are declared in the month of December on website https://swayam.gov.in/.

Notice: The SWAYAM course coordinator will ensure that the students are informed about MOOCs courses well before time so that students get registered in the courses decided by the departmental committee.

Effective from the session 2022-23
BET-C862
MAJOR PROJECT

MM : 400 **ESE : 300**
Credit : 8 **Sessional : 100**

OBJECTIVE: The object of Major Project Work & Dissertation is to enable the student to extend further the investigative study taken up under EC P1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry. This is expected to provide a good training for the student(s) in R&D work and technical leadership. The assignment to normally include:

1. In depth study of the topic assigned in the light of the Report prepared under EC P1;
2. Review and finalization of the Approach to the Problem relating to the assigned topic;
3. Preparing an Action Plan for conducting the investigation, including team work;
4. Detailed Analysis/Modelling/Simulation/Design/Problem Solving/Experiment as needed;
5. Final development of product/process, testing, results, conclusions and future directions;
6. Preparing a paper for Conference presentation/Publication in Journals, if possible;
7. Preparing a Dissertation in the standard format for being evaluated by the Department.
8. Final Seminar Presentation before a Departmental Committee.

INSTRUCTIONS FOR STUDENTS: Each student shall be assigned a Major Project by departmental committee. The student shall be required to perform his project work under the supervision of the supervisor(s). There shall be a seminar on the project work of the student to be evaluated by a departmental committee chaired by H.O.D. The student shall be required to submit his project report in the form of dissertation 15 days before the end of VIII semester. The student shall be required to submit three copies of the project work with certificate from the supervisor(s) that the work is authentic record of the work performed by him. The report shall be forwarded by H.O.D. The report of the project work shall be evaluated by the external examiner(s). The same external examiner(s) shall hold the viva-voce examination.

THE DISTRIBUTION OF MARKS FOR THE MAJOR PROJECT SHALL BE AS FOLLOWS:

MAJOR PROJECT	
Project**	200
Viva-voce/Presentation**	100
Seminar (Internal)***	100
Total	400

** - Marks for the project work shall be awarded jointly by the external and internal examiners after viva-voce examination.

*** - There shall be a seminar on the project work of the student to be evaluated by the departmental committee chaired by H.O.D.