P.K.UNIVERSITY, SHIVPURI (M.P.)
(FACULTY OF ENGINEERING & TECHNOLOGY)

EVALUATION SCHEME & SYLLABUS FOR

B. TECH.

ELECTRICAL & ELECTRONICS ENGINEERING

(4TH YEAR)

Effective from

Session: 2025-26

P.K.University,Vill-Thanra,Teh-Karera,Distt-Shivpuri (M.P.) 473665

EVALUATION SCHEME
Electrical & Electronics Engineering

Study And Evaluation Scheme For B.Tech Electrical & Electronics Engineering											
Year- 4th / Semester -7th											
Subject Code	**Subjects Name**	**Study Scheme Periods/Week**			**Credits**	**Marks in Evaluation Scheme**						**Total Marks of Internal & External**
						Internal Assessment			**External Assessment**			
		L	**T**	**P**		**Th**	**Pr**	**Total Internal**	**Th**	**Pr**	**Total External**	**Grand Total**
UENTREX701	Entrepreneurship Development	3	0	0	3	30	-	30	70	-	70	100
UELECEX702	Electric Drives	4	0	0	4	30	-	30	70	-	70	100
UPOWEEX703	Power Station Practice	3	0	0	3	30	-	30	70	-	70	100
UANALEX704	Analog & Digital Communication	3	0	0	3	30	-	30	70	-	70	100
UPOWEEX705	Power System Operation and Control	4	0	0	4	30	-	30	70	-	70	100
UELECEX706	Electric Drives Lab	0	0	2	1	-	25	25	-	25	25	50
UANALEX707	Analog & Digital Communication Lab	0	0	2	1	-	25	25	-	25	25	50
UMINIEX708	Minor project	0	0	2	1	-	25	25	-	25	25	50
UINDUEX709	Industrial Training	0	0	2	1	-	25	25	-	25	25	50
Total		**17**	**0**	**8**	**21**	**150**	**100**	**250**	**350**	**100**	**450**	**700**
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												**325**

Study And Evaluation Scheme For B.Tech Electrical Engineering											
Year- 4th /Semester -8th											
Subject Code	**Subjects Name**	**Study Scheme Periods/Week**			**Credits**	**Marks in Evaluation Scheme**						**Total Marks of Internal & External**
						Internal Assessment			**External Assessment**			
		L	**T**	**P**		**Th**	**Pr**	**Total Internal**	**Th**	**Pr**	**Total External**	**Grand Total**
UNONCEX801	Non-Conventional Energy Resources	3	0	0	3	30	-	30	70	-	70	100
UADVAEX802	Advanced Control System	4	0	0	4	30	-	30	70	-	70	100
USATEEX803	Satellite Communication	4	0	0	4	30	-	30	70	-	70	100
UDATAEX804	Data Communication Networks	3	0	0	3	30	-	30	70	-	70	100
UMAJOEX805	Major project	0	0	12	7	-	100	100	-	200	200	300
Total		**14**	**0**	**12**	**21**	**120**	**100**	**220**	**280**	**200**	**480**	**700**
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												**275**

Department of Electrical & Electronics Engineering
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P.K. University, Shivpuri (MP)
4th Year / 7th Semester

UENTREX701: Entrepreneurship Development	
Credit:3	**Max Marks:100 (IA:30,ETE:70)**
3L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able:

1. The purpose of this course is to expose the student to the basic concepts of entrepreneurship, functions of entrepreneurs and problems faced by them in the real world.

2. To provide insights to students in converting an Idea to an opportunity and develop understanding of various funding sources for a startup.

3. To understand the technological, human, economic, organizational, social and other dimensions of innovation.

4. To understand the role of innovation and technical change in enterprise and global level economic performance

Unit	Contents	Hours
1	**Entrepreneurship:** Definition. Growth of small scale industries in developing countries and their positions vis- a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.	08
2	**Project identification:** Assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods,	08

	benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.	
3	**Accountancy:** Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.	**08**
4	**Project Planning and control:** The financial functions cost of capital in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations. Control of financial flows, control and communication.	**08**
5	Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.	**08**

Text Books:

1. Forbat, John, —Entrepreneurship‖ New Age International.
2. Havinal, Veerbhadrappa, —Management and Entrepreneurship‖ New Age International
3. Joseph, L. Massod, —Essential of Management", Prentice Hall of Indi

UELECEX702: Electric Drives	
Credit:4	**Max Marks:100 (IA:30,ETE:70)**
4L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able:
1. Describe the operation of electric drives and its classification.
2. Explain the electric drive stability and selection of motor power rating.
3. Illustrate electric braking and its dynamics.
4. Describe the types of AC drives and its control.

Unit	Contents	Hours
1	**Fundamentals of Electric Drive:** Electric Drives and its parts, advantages of electric drives Classification of electric drives Speed-torque conventions and multi-quadrant operations Constant torque and constant power operation Types of load torque: components, nature and classification.	08
2	**Dynamics of Electric Drive:** Dynamics of motor-load combination Steady state stability of Electric Drive Transient stability of electric Drive. **Selection of Motor Power rating:** Thermal model of motor for heating and cooling, classes of motor duty, determination of motor power rating for continuous duty, short time duty and intermittent duty. Load equalization.	08
3	**Electric Braking:** Purpose and types of electric braking, braking of DC, three phase induction and synchronous motors **Dynamics during Starting and Braking:** Calculation of acceleration time and energy loss during starting of DC shunt and three phase induction motors, methods of reducing energy loss during starting. Energy relations during braking, dynamics during braking.	08

4	**Power Electronic Control of DC Drives:** Single phase and three phase controlled converter fed separately excited DC motor drives (continuous conduction only), dual converter fed separately excited DC motor drive, rectifier control of DC series motor. Supply harmonics, power factor and ripples in motor current Chopper control of separately excited DC motor and DC series motor.	08
5	**Power Electronic Control of AC Drives:** **Three Phase induction Motor Drive:** Static Voltage control scheme, static frequency control scheme (VSI, CSI, and cyclo – converter based) static rotor resistance and slip power recovery control schemes. Three Phase Synchronous motor: Self-controlled scheme **Special Drives:** Switched Reluctance motor, Brushless dc motor. Selection of motor for particular applications.	08

Text Books:

1. G.K. Dubey, ―Fundamentals of Electric Drves‖, Narosa publishing House.

2. S.K. Pillai, ―A First Course on Electric Drives‖, New Age International.

3 V. Subrahmanyam, ―Electric Drives: Concepts and Applications‖, Tata McGrawHill.

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UELECEX706: Electric Drives Lab	
Credit:1	**Max Marks:50 (IA:25,EA:25)**
0L+0T+2P	**End Term Exams: 2 hrs.**

Note: Minimum ten experiments are to be performed from the following list:

List of Experiments

1. Study of thyristor controlled DC Drives.

2. Study of Chopper fed DC Drives.

3. Study of AC Single phase motor –speed control using TRIAC.

4. PWM inverter fed 3-phase Induction motor control using PSPICE/MATLAB/PSIM Software.

5. VSI/CSI Induction motor Drive analysis using PSPICE/MATLAB/PSIM Software.

6. Study of V/F control operation of 3-phase Induction motor Drives.

7. Regenerative braking operation for DC motor-study using software.

8. Dynamic braking operation for DC motor-study using software.

9. PC/ PLC based forward/reverse motion control operation of Induction motor.

10. Dynamic braking operation for AC motor-study using software.

11. Regenerative braking operation for AC motor-study using software.

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UPOWEEX703: Power Station Practice	
Credit:4	Max Marks:100 (IA:30,ETE:70)
4L+0T+0P	End Term Exams: 3 hrs.

Course Outcome: - On successful completion of this course, the students will be able:
1. Understand the awareness of electrical energy demand, growth and electrical energy sources in India.
2. Understand the general layout and operation of thermal and hydro power plant.
3. Understand the operation of nuclear power plant, Gas turbine plant and diesel plant.
4. Draw substation layout.
5. Describe the various terms related to power plant economics and power tariffs.
6. Impart the knowledge of generation of electricity based on non-conventional energy sources

Unit	Contents	Hours
1	**Introduction:** Electric energy demand and growth in India, electric energy sources. Thermal Power Plant: Site selection, general layout and operation of plant, detailed description and use of different parts. **Hydro Electric Plants:** Classifications, location and site selection, detailed description of various components, general layout and operation of Plants, brief description of impulse, reaction, Kaplan and Francis turbines, advantages & disadvantages, hydro-potential in India.	08
2	**Nuclear Power Plant:** Location, site selection, general layout and operation of plant. Brief description of different types of reactors Moderator material, fissile materials, control of nuclear reactors, disposal of nuclear waste	08

	material, shielding. **Gas Turbine Plant:** Operational principle of gas turbine plant & its efficiency, fuels, open and closed-cycle plants, regeneration, inter-cooling and reheating, role and applications. **Diesel Plants:** Diesel plant layout, components & their functions, its performance, role and applications.	
3	**Sub-stations Layout:** Types of substations, bus-bar arrangements, and typical layout of substation. **Power Plant Economics and Tariffs:** Load curve, load duration curve, different factors related to plants and consumers, Cost of electrical energy, depreciation, generation cost, effect of Load factor on unit cost. Fixed and operating cost of different plants, role of load diversity in power system economy. Objectives and forms of Tariff; Causes and effects of low power factor, advantages of power factor improvement, different methods for power factor improvements.	08
4	**Economic Operation of Power Systems:** Characteristics of steam and hydro-plants, Constraints in operation, Economic load scheduling of thermal plants neglecting and considering transmission Losses, Penalty factor, loss coefficients, Incremental transmission loss. Hydrothermal Scheduling.	08
5	**Non-Conventional Energy Sources:** Power Crisis, future energy demand, role of Private sectors in energy management, concepts & principals of MHD generation, Solar power plant, Wind Energy, Geothermal Energy, Tidal energy, Ocean Thermal Energy.	08

Text Books:

1. B.R. Gupta, —Generation of Electrical Energy‖, S. Chand Publication.

2. Soni, Gupta & Bhatnagar, —A text book on Power System Engg.‖, Dhanpat Rai & Co.

3. P.S.R. Murthy, —Operation and control of Power System‖ BS Publications, Hyderabad. Reference Books:

4. W. D. Stevenson, —Elements of Power System Analysis‖, McGraw Hill.

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UANALEX704: Analog & Digital Communication	
Credit:3	**Max Marks:100 (IA:30,ETE:70)**
4L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able:
1. Understand the Amplitude Modulation in communication system.
2. Comprehend the Frequency & Phase modulation
3. Realize the Pulse Modulation Techniques.
4. Get the Digital Modulation Techniques and their use in communication system.
5. Apply the concept of Information Theory in Communication Engineering.

Unit	Contents	Hours
1	Elements of communication system and its limitations Amplitude Modulation: Amplitude modulation and detection, Generation and detection of DSB-SC, SSB and vestigial side band modulation, carrier acquisition AM transmitters and receivers, super heterodyne receiver, IF amplifiers, AGC circuits Frequency Division multiplexing	08
2	Angle Modulation: Basic definitions Narrow band and wideband frequency modulation, transmission bandwidth of FM signals Generation and detection of frequency modulation Noise: External noise, internal noise calculations, signal to noise ratio Noise in AM and FM systems.	08
3	**Pulse Modulation:** Introduction, sampling process Analog Pulse Modulation Systems-Pulse Amplitude Modulation, Pulse width modulation and Pulse Position Modulation. Waveform coding Techniques: Discretization	08

	in time and amplitude, Quantization process, quantization noise, Pulse code Modulation, Differential Pulse code Modulation, Delta Modulation and Adaptive Delta Modulation.	
4	**Digital Modulation Techniques:** Types of digital modulation, waveforms for amplitude, frequency and phase shift keying, methods of generation of coherent and non-coherent, ASK, FSK and PSK, comparison of above digital techniques.	**08**
5	**Time Division Multiplexing:** Fundamentals, Electronic Commutator, Bit/byte interleaving, TI carrier system, synchronization and signaling of TI, TDM and PCM hierarchy, synchronization techniques Introduction to Information Theory: Measure of information, Entropy & Information rate, channel capacity, Hartley Shannan law, Huffman coding, shannan Fano coding.	**08**

Text Books:

1. Simon Haykin,— Communication Systems‖ John Wiley & Sons 4th Edition

2. G.Kennedy and B. Davis,‖ Electronic Communication Systems‖ 4th Edition, Tata McGraw Hill

3. Simon Haykin, —Digital Communications‖ John Wiley & Sons

4. T.L. Singal, —Analog & Digital Communication‖, Tata Mc Graw Hill

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UANALEX707: Analog & Digital Communication Lab	
Credit:1	Max Marks:50 (IA:25,EA:25)
0L+0T+2P	End Term Exams: 2 hrs.

Note: The minimum 10 experiments are to be performed from the following:

1. To study amplitude modulation using a transistor and determine depth of Modulation.
2. To study generation of DSB-SC signal using balanced modulator.
3. To study generation of SSB signal
4. To study envelope detector for demodulation of AM signal and observe Diagonal peak Clipping effect.
5. To study super heterodyne AM receiver and measurement of sensitivity, Selectivity and fidelity.
6. To study frequency modulation using voltage controlled oscillator.
7. To detect FM signal using Phase Locked Loop.
8. To measure noise figure using a noise generator.
9. To study PAM, PWM and PPM.
10. To realize PCM signal using ADC and reconstruction using DAC and 4 Bit/8bit system. Observe quantization noise in each case.
11. To study Delta Modulation and Adaptive Delta Modulation.
12. To study PSK-modulation system. 13. To study FSK-modulation system.
14. To study sampling through a Sample-Hold circuit and reconstruction of the Sampled signal and observe the effect of sampling rate & the width of the Sampling pulses.
14. To study functioning of color television
15. Fabricate and test a PRBS generator
16. Realization of data in different forms, such as MRZ-L, NRZ - M&N, NRZ-S.
17. Manchester coding & decoding (Bi phase L) of NRZ-L data.

UPOWEEX705: Power System Operation and Control	
Credit:4	Max Marks:100 (IA:30,ETE:70)
4L+0T+0P	End Term Exams: 3 hrs.

Course Outcome: - On successful completion of this course, the students will be able:

1. Analyze the various load characteristics with load curve and load duration curve.
2. Describe modeling of power-frequency dynamics and design power-frequency controller.
3. Explain the modeling of reactive power-voltage interaction and the control actions.
4. Solve economic dispatch problems and unit commitment problems in power systems.
5. Explain the need of State Estimation.

Unit	Contents	Hours
1	**Introduction:** Structure of power systems, Power system control center and real time computer control, SCADA system Level decomposition in power system Power system security various operational stages of power system Power system voltage stability.	08
2	**Economic Operation:** Concept and problems of unit commitment Input-output characteristics of thermal and hydro-plants System constraints Optimal operation of thermal units without and with transmission losses, Penalty factor, incremental transmission loss, transmission loss formula (without derivation) Hydrothermal scheduling long and short terms Concept of optimal power flow.	08

3	**Load Frequency Control:** Concept of load frequency control, Load frequency control of single area system: Turbine speed governing system and modeling, block diagram representation of single area system, steady state analysis, dynamic response, control area concept, P-I control, load frequency control and economic dispatch control. Load frequency control of two area system: Tie line power modeling, block diagram representation of two area system, static and dynamic response.	**10**
4	**Automatic Voltage Control:** Schematic diagram and block diagram representation, different types of Excitation systems & their controllers. **Voltage and Reactive Power control:** Concept of voltage control, methods of voltage control by tap changing transformer. Shunt Compensation, series compensation, phase angle compensation.	**08**
5	**State Estimation:** Detection and identification, Linear and Non-linear models. **Flexible AC Transmission Systems:** Concept and objectives FACTs controllers: Structures & Characteristics of following FACTs Controllers. TCR, FC-TCR, TSC, SVC, STATCOM, TSSC, TCSC, SSSC, TC-PAR, UPFC	**06**

Text Books:

1. D.P. Kothari & I.J. Nagrath, ―Modern Power System Analysis‖ Tata Mc Graw Hill, 3rd Edition.
2. P.S.R. Murty, ―Operation and control in Power Systems‖ B.S. Publications.
3. N. G. Hingorani & L. Gyugyi, ―Understanding FACTs‖ Concepts and Technology of Flexible AC Transmission Systems‖
4. A. J. Wood & B.F. Wollenburg, ―Power Generation, Operation and Control ― John Wiley & Sons.

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UMINIEX708: Minor Project	
Credit:1	**Max Marks:50 (IA:25,EA:25)**
0L+0T+2P	**End Term Exams: 2 hrs.**

Course Outcome: - On successful completion of this course, the students will be able:

1. Investigate the emerging problems in electrical engineering and solve them by referring standard journals.

2. Illustrate the state-of-the-art technologies in the area of electrical engineering.

3. Analyze various technological advancements in the area of machines, control system through software or hardware implementation.

4. Understand and evaluate the area for future knowledge and skill development.

5. Formulate a research paper and write the project report.

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UINDUEX709: INDUSTRIAL TRAINING	
Credit:1	**Max Marks:50 (IA:25,EA:25)**
6 WEEKS / 45 DAYS - IDUSTRY WORK EXPERIENCE WITH TRAINING REPORT & CERTIFICATE	

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4th Year / 8th Semester

UNONCEX801: Non- Conventional Energy Resources	
Credit:3	**Max Marks:100 (IA:30,ETE:70)**
3L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able

1. Identify energy demand and relate with available energy resources
2. Analyze harnessing of solar energy.
3. Analyze harnessing of wind energy.
4. Analyze harnessing of Biomass energy.
5. Analyze harnessing of Geothermal and Ocean energies.
6. Analyze Magneto hydrodynamics and Fuel cell technology.

Unit	Contents	Hours
1	**Introduction:** Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits. Solar Cells: Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations.	**06**
2	**Solar Thermal Energy:** Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.	**06**
3	**Geothermal Energy:** Resources of geothermal energy, thermodynamics of geo-thermal energy conversion- electrical conversion, non-electrical conversion, environmental considerations. **Magneto-hydrodynamics**	**06**

	(MHD): Principle of working of MHD Power plant, performance and limitations. Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.		
4	**Thermo-electrical and thermionic Conversions:** Principle of working, performance and limitations. **Wind Energy:** Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems.	**06**	
5	**Bio-mass:** Availability of bio-mass and its conversion theory. **Ocean Thermal Energy Conversion (OTEC):** Availability, theory and working principle, performance and limitations. Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants.	**06**	

Text/References Books:
1. Raja etal, ―Introduction to Non-Conventional Energy Resources‖ Scitech Publications.
2. John Twideu and Tony Weir, ―Renewal Energy Resources‖ BSP Publications, 2006.
3. M.V.R. Koteswara Rao, ―Energy Resources: Conventional & Non-Conventional ―BSP Publications, 2006.
4. D.S.Chauhan,‖Non-conventional Energy Resources‖ New Age International.
5. C.S. Solanki, ―Renewal Energy Technologies: A Practical Guide for Beginners‖ PHI Learning.
6. Peter Auer "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.

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UADVAEX802: Advanced Control System	
Credit:4	Max Marks:100 (IA:30,ETE:70)
4L+0T+0P	End Term Exams: 3 hrs.

Course Outcome: - On successful completion of this course, the students will be able
1. Do state space analysis of continuous system.
2. Describe the dynamics of a linear, time invariant and causal digital system through difference equations.
3. Determine the stability of discrete control system.
4. Analyze nonlinear system by using phase plane method.
5. Understand the concept of optimal and adaptive control system.

Unit	Contents	Hours
1	**State Space Analysis of Continuous System:** State space analysis, Solution of state equation, determination of state-transition matrix, using Laplace method, Similarity transformation method and Caley-Hamilton Method.	08
2	**Analysis of Discrete System:** Concept of state feedback design, Determination of controllability Matrix and test of controllability, State feedback controller design via pole placement method, Concept of state observer design, Determination of the observability matrix and test of observability condition, Design of the full state observer using pole placement.	08
3	**Nonlinear systems:** Nonlinear System Modeling Analysis of Nonlinear system (Inverted Pendulum) via Linearization, Describing function analysis of nonlinear system, Stability Analysis of Nonlinear system using Describing function Analysis.	08
4	**Phase Plan Analysis:** Construction of Phase portrait using Isoclines approach, Singular points, and Phase plane analysis of 2nd order linear system, Phase plane analysis of nonlinear control system.	08

| 5 | **Liapunov Stability Analysis:** Concept of stability in the sense of Liapunov. Linear system analysis using Liapunov approach, Determination of Liapunov functions using variable gradient method, Stability analysis of nonlinear systems. | 08 |

Text Books:

1. M. Gopal, ―Digital Control and State variable Methods‖, Tata Mc Graw Hill.

2. Ajit K. Madal, ―Introduction to Control Engineering: Modelling, Analysis and Design‖ New Age International.

3. K. Ogata, ―Modern Control Engineering‖, PHI.

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USATEEX803: Satellite Communication	
Credit:4	**Max Marks:100 (IA:30,ETE:70)**
4L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able

1. Define and list the benefits of satellite communication.

2. Demonstrate orbital mechanics principles of satellite communication systems and solve problems related to it.

3. Describe a satellite link and identify ways to improve the link performance.

4. Classify new technologies of satellite communication systems as per given specifications.

5. Examine advanced technologies of satellite launching and describe the Indian satellite system.

Unit	Contents	Hours
1	Elements of Satellite Communication Orbital mechanics look angle and orbit determination, launches & launch vehicle, orbital effects, Geostationary Orbit.	**08**
2	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.	**08**

3	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 accesses: FDMA, TDMA, DAMA and CDMA.	**08**
4	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.	**08**
5	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. .	**08**

Text 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

UDATAEX804:Data Communication Networks	
Credit:3	**Max Marks:100 (IA:30,ETE:70)**
4L+0T+0P	**End Term Exams: 3 hrs.**

Course Outcome: - On successful completion of this course, the students will be able

1. Identify the issues and challenges in the architecture of a network.
2. Analyze the services and features of various protocol layers in data layer.
3. Demonstrate the knowledge of multiple accesses to design a access technique for a particular application.
4. Realize protocols at different layers of a network hierarchy.
5. Recognize security issues in a network and various application of application layer.

Unit	Contents	Hours
1	Communication problem and system models, components of communication systems, communication channels and their characteristics, mathematical models for communication channels, multiple access techniques, link budget analysis .	08
2	Representation of deterministic and stochastic signals, random noise characterization in communication systems, signal-to-noise ratio, characterization of communication signals and systems: signal space representations, representation of analog and digitally modulated signals, spectral characteristics of modulated signals.	08
3	Optimal receivers: Receivers for signals corrupted by AWGN, Error performance Analysis of receivers for memory-less modulation, optimal receivers for modulation methods with memory, OFDM, MIMO, Source Coding, Channel Coding (Hamming codes).	08

4	Error Control, Flow Control, Sliding Window Protocols, HDLC, PPP, Local area networks: Ethernet, Fast Ethernet, Token Ring, Introduction to Gigabit Ethernet and Wireless LANs; Hubs, bridges and switches.	08
5	MAC Layer Static Channel Allocation in LANs and MANs, Dynamic Channel Allocation in LANs and MANs, ALOHA, Carrier Sense Multiple Access Protocols, Collision Free Protocols, Limited-Contention Protocols, Wavelength Division Multiple Access Protocols, Wireless LAN Protocols, IEEE Standard 802.3	08

Text Books:

1. Madhow, U., (2008), Fundamentals of Digital Communication, Cambridge University Press

2. Lathi, B. P. & Ding, Z., (2010), Modern Digital and Analog Communication Systems, Oxford University Press

3. Stallings, W., (2010), Data and Computer Communications, Pearson.

4. Andrew S. Tanenbaum, ―Computer Networks‖ Pearson.

5. Ajit Pal, ―Data Communication and Computer Networks‖, PHI

6. Dimitri Bertsekas, Robert G. Gallager, ―Data Networks‖, Prentice Hall, 1992.

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UMAJOEX805: Major Project	
Credit:7	**Max Marks:100 (IA:50,EA:50)**
0L+0T+14P	**End Term Exams: 2 hrs.**

Course Outcome: - On successful completion of this course, the
students will be able:

1. Identify the particular problem in the field and demonstrate independent learning.
2. Plan, design and analyze the particular problem as project.
3. Demonstrate the usefulness of project in society and understanding of professional ethics and participate in a class or project team.