

5.1 ELECTRICAL MACHINES-II

L T P
4 - 3

RATIONALE

Electrical machines is a subject where a student will deal with various types of electrical machines which are employed in industries, power stations, domestic and commercial appliances etc. After studying this subject, an electrical diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Explanation of practical aspects of the subject will make the students capable of performing various tests on the machines as per latest BIS specifications

DETAILED CONTENTS

1. Synchronous Machines (24 hrs)
 - 1.1 Main constructional features of synchronous machine including commutator and brushless excitation system
 - 1.2 Generation of three phase emf
 - 1.3 Production of rotating magnetic field in a three phase winding
 - 1.4 Concept of distribution factor and coil span factor and emf equation
Armature reaction at unity, lag and lead power factor
 - 1.5 Operation of single synchronous machine independently supplying a load -
Voltage regulation by synchronous impedance method
 - 1.6 Need and necessary conditions of parallel operation of alternators
Synchronizing an alternator (Synchroscope method) with the bus bars
 - 1.7 Operation of synchronous machine as a motor –its starting methods
 - 1.8 Effect of change in excitation of a synchronous motor
 - 1.9 Concept and Cause of hunting and its prevention
 - 1.10 Rating and cooling of synchronous machines
 - 1.11 Applications of synchronous machines (as an alternator, as a synchronous condenser)

2. Induction Motors (16 hrs)
 - 2.1 Salient constructional features of squirrel cage and slip ring 3-phase induction motors
 - 2.2 Principle of operation, slip and its significance
 - 2.3 Locking of rotor and stator fields
 - 2.4 Rotor resistance, inductance, emf and current
 - 2.5 Relationship between copper loss and the motor slip

- 2.6 Power flow diagram of an induction motor
 - 2.7 Factors determining the torque
 - 2.8 Torque-slip curve, stable and unstable zones
 - 2.9 Effect of rotor resistance upon the torque slip relationship
 - 2.10 Double cage rotor motor and its applications
 - 2.11 Starting of 3-phase induction motors, DOL, star-delta, auto transformer
 - 2.12 Causes of low power factor of induction motors
 - 2.13 Testing of 3-phase motor on no load and blocked rotor test and to find efficiency
 - 2.14 Speed control of induction motor
 - 2.15 Harmonics and its effects, cogging and crawling in Induction Motors.
3. Fractional Kilo Watt (FKW) Motors (16 hrs)
- 3.1 Single phase induction motors; Construction characteristics and applications
 - 3.2 Nature of field produced in single phase induction motor
 - 3.3 Split phase induction motor
 - 3.3.1 Capacitors start and run motor
 - 3.3.2 Shaded pole motor
 - 3.3.3 Reluctance start motor
 - 3.4 Alternating current series motor and universal motors
 - 3.5 Single phase synchronous motor
 - 3.5.1 Reluctance motor
 - 3.5.2 Hysteresis motor
4. Special Purpose Machines (8 hrs)
- Construction and working principle of linear induction motor, stepper motor, Servomotor, Submersible Motor, Introduction to Energy efficient Motors.

LIST OF PRACTICALS

1. Demonstration of revolving field set up by a 3-phase wound stator
2. To plot relationship between no load terminal voltage and excitation current in a synchronous generator at constant speed
3. Determination of the relationship between the voltage and load current of an alternator, keeping excitation and speed constant

4. Determination of the regulation and efficiency of alternator from the open circuit and short circuit test
5. Synchronization of polyphase alternators and load sharing
6. Determination of the effect of variation of excitation on performance of a synchronous motor
7. Study of ISI/BIS code for 3-phase induction motors
8. Perform at least two tests on a 3- phase induction motor as per BIS code
9. Determination of efficiency by (a) no load test and blocked rotor test on an induction motor (b) direct loading of an induction motor (refer BIS code)
10. Determination of effect of rotor resistance on torque speed curve of an induction motor
11. To study the effect of a capacitor on the starting and running of a single-phase induction motor by changing value of capacitor and also reverse the direction of rotation of a single phase induction motor

INSTRUCTIONAL STRATEGY

Teacher should lay-emphasis on development of understanding amongst students about basic principles of operation and control of electrical machines. This may be achieved by conducting quiz tests and by giving home assignments. The teachers should also conduct laboratories classes themselves encouraging each should to perform with his/her own hands and draw conclusions.

RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, New Delhi
2. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
3. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
Electrical Engineering by JB Gupta, SK Kataria and sons, New Delhi
4. Electrical Machines by Samarjit Ghosh, Pearson Education (Singapore) Pte, Ltd. 482, FIE Patparganj, Delhi 110092
5. Electrical Machines by DR Arora, Ishan Publications, Ambala City.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1	Synchronous Machines	24	40
2	Induction Motors	16	25
3	Fractional Kilo Watt Motors	16	25
4	Special Purpose Machines	8	10
	Total	64	100

5.2 ELECTRICAL POWER –I

L P
4 -

RATIONALE

The majority of the polytechnic passouts who get employment in State Electricity Boards have to perform various activities in the field of Generation, Transmission and Distribution of Electrical power. The range of these activities vary from simple operation and maintenance of equipment, lines, fault location, planning and designing of simple distribution schemes, executive and supervisory control in power stations, transmission and distribution networks in addition to administrative jobs including public relations. They should also be made aware of recent developments, current practices in the electricity departments, corporations and boards to keep them abreast with modern techniques in Transmission and Distribution of Electrical Power.

DETAILED CONTENTS

1. Power Generation (10 hrs)
 - 1.1 Main resources of energy, conventional and non-conventional
 - 1.2 Different types of power stations, thermal, hydro, gas, diesel and nuclear power stations. Flow diagrams and brief details of their operation, comparison of the generating stations on the basis of running cost, site, starting, maintenance etc.
 - 1.3 Importance of non-conventional sources of energy in the present scenario. Brief details of solar energy, bio-energy, wind energy

2. Economics of Generation (08 hrs)
 - 2.1 Fixed and running cost, load estimation, load curves, demand factor, load factor, diversity factor, power factor and their effect on cost of generation, simple problems there on.
 - 2.2 Base load and peak load power stations, inter-connection of power stations and its advantages, concept of regional and national grid.

3. Transmission Systems (20 hrs)
 - 3.1 Layout of transmission system, selection of voltage for H.T and L.T lines, advantages of high voltage for Transmission both AC and DC
 - 3.2 Comparison of different system: AC versus DC for power transmission, conductor material and sizes from standard tables
 - 3.3 Constructional features of transmission lines: Types of supports, types of insulators, Types of conductors, Selection of insulators, conductors, earth wire and their accessories, Transposition of conductors and string efficiency of suspension type insulators, Bundle Conductors.

- 3.4 Mechanical features of line: Importance of sag, calculation of sag, effects of wind and ice related problems; Indian electricity rules pertaining to clearance
- 3.5 Electrical features of line: Calculation of resistance, inductance and capacitance without derivation in a.c. transmission line, voltage regulation, and concept of corona. Effects of corona and remedial measures
- 3.6 Transmission Losses
- 4. Distribution System (14 hrs)
 - 4.1 Lay out of HT and LT distribution system, constructional feature of distribution lines and their erection. LT feeders and service mains; Simple problems on AC radial distribution system, determination of size of conductor
 - 4.2 Preparation of estimates of HT and LT lines (OH and Cables).
 - 4.3 Constructional features of LT (400 V), HT (11 kV) underground cables, advantages and disadvantages of underground system with respect to overhead system.
 - 4.4 Calculation of losses in distribution system
 - 4.5 Faults in underground cables-determine fault location by Murray Loop Test, Varley Loop Test, Blavier's Test
- 5. Substations: (08 hrs)
 - 5.1 Brief idea about substations; out door grid sub-station 220/132 kV, 66/33 kV outdoor substations, pole mounted substations and indoor substation
 - 5.2 Layout of 33/11 kV/400V distribution substation and various auxiliaries and equipment associated with it
- 6. Power Factor: (4 hrs)
 - 6.1 Concept of power factor
 - 6.2 Reasons and disadvantages of low power factor
 - 6.3 Methods for improvement of power factor using capacitor banks, VAR Static Compensator (SVC)

INSTRUCTIONAL STRATEGY

Since this is a descriptive and practice oriented subject, it is suggested that visits to different types of power generating stations and substations including grid stations be arranged and various equipment, accessories and components explained to the students before the actual class room teaching and make them familiar with the equipment and accessories installed over there. There

should be at least 3 visits during the semester. The students may be asked to prepare notes while on visit and submit the report and give seminar. In addition, viva-voce be conducted to evaluate the knowledge gained during the field visit.

RECOMMENDED BOOKS

1. Electrical Power System and Analysis by CL Wadhwa, 3rd edition, New Age International Publishers, New Delhi
2. Substation Design and Equipment by Satnam and PV Gupta, Dhanpat Rai & Sons, New Delhi
3. Electrical Power –I by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Power System by VK Mehta, S Chand and Co., New Delhi
5. Electrical Power System by JB Gupta, SK Kataria and Sons, New Delhi
6. Sub-Station Design by PS Satnam, Dhanpat Rai and Co., New Delhi
7. Electrical Power Distribution System by AS Pabla, Tata McGraw Hill, New Delhi
8. Electrical Power System by S Channi Singh, Tata McGraw Publishing Co. New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1	Power Generation	10	15
2	Economics of Generation	8	10
3	Transmission Systems	20	35
4	Distribution System	14	20
5	Substations	8	10
6	Power Factor	4	10
	Total	64	100

5.3 INDUSTRIAL ELECTRONICS AND CONTROL OF DRIVES

L P
4 3

RATIONALE

Industrial electronics plays a very vital role in the field of control engineering specifically in the modern industries as they mostly use electronic controls, which are more efficient, effective and precise as compare to the conventional methods. The old magnetic and electrical control schemes have all become obsolete. Electrical diploma holder many times has to maintain the panels used in the modern control process. Therefore, the knowledge of components like thyristors and other semiconductor devices used in such control panels is must for them in order to supervise the work efficiently and effectively. Looking in to usefulness and importance of the subject this has been incorporated in the curriculum.

DETAILED CONTENTS

1. Introduction to SCR (16 hrs)
 - 1.1. Construction and working principles of an SCR, two transistor analogy and characteristics of SCR
 - 1.2. SCR specifications and rating
 - 1.3. Construction, working principles and V-I characteristics of DIAC, TRIAC and Quadriac
 - 1.4. Basic idea about the selection of heat sinks for SCR and TRIACS
 - 1.5. Methods of triggering a Thyristor. Study of triggering circuits
 - 1.6. UJT, its Construction, working principles and V-I characteristics, UJT relaxation oscillator
 - 1.7. Commutation of Thyristors
 - 1.8. Series and parallel operation of Thyristors
 - 1.9. Applications of SCR, TRIACS and Quadriac such as light intensity control, speed control of DC and universal motor, fan regulator, battery charger etc.
 - 1.10. dv/dt and di/dt protection of SCR.

2. Controlled Rectifiers (10 hrs)
 - 2.1 Single phase half wave controlled rectifier with resistive load and inductive load, concept of free wheeling diode.
 - 2.2 Single phase half controlled full wave rectifier
 - 2.3 Single phase fully controlled full wave rectifier bridge.
 - 2.4 Single phase full wave centre tapped rectifier
 - 2.5 Three phase full wave half controlled bridge rectifier
 - 2.6 Three phase full wave fully controlled bridge rectifier

3. Inverters, Choppers, Dual Converters and Cyclo Converters (18 hrs)
 - 3.1 Inverter-introduction, working principles, voltage and current driven series and parallel inverters and applications
 - 3.2 Choppers-introduction, types of choppers and their working principles and applications
 - 3.3 Dual converters-introduction, working principles and applications
 - 3.4 Cyclo-converters- introduction, types, working principles and applications

4. Thyristor Control of Electric Drives (15 hrs)
 - 4.1 DC drives control (Basic Concept)
 - 4.2 Half wave drives
 - 4.3 Full wave drives
 - 4.4 Chopper drives
 - 4.5 AC drives control
 - 4.6 Phase control
 - 4.7 Variable frequency a.c. drives
 - 4.8 Constant V/F application
 - 4.9 Voltage controlled inverter drives
 - 4.10 Constant current inverter drives
 - 4.11 Cyclo convertors controlled AC drives
 - 4.12 Slip control AC drives

5. Uninterrupted power supplies (5 hrs)
 - 5.1 UPS online, off line
 - 5.2 Storage devices (batteries)

LIST OF PRACTICALS

1. To draw V-I characteristics of an SCR
2. To draw V-I characteristics of a TRIAC
3. To draw V-I characteristics of a DIAC
4. To draw uni-junction transistor characteristics
5. Observe the output wave of an UJT relaxation oscillator
6. Observe the wave shape across SCR and load of an illumination control circuit
7. Fan speed regulator using TRIAC Quadriac (fabrication of this circuit)
8. Speed-control of a DC shunt motor or universal motor
9. To observe the output wave shape on CRO of a Single phase half controlled full wave rectifier
10. Single phase controlled rectifier

INSTRUCTIONAL STRATEGY

The teachers may encourage students to perform practicals simultaneously for better verification of theoretical concepts and understanding of the subject . The various components must be shown to the students for identification and also tested. Practical applications of the various circuits and devices should be discussed in the class. The available video films on the subject must be shown to the students.

BOOKS RECOMMENDED

1. Industrial Control Electronics. John Webb, Kevin Greshock, Maxwell, Macmillan International editions.
2. Fundamentals of Power Electronics by S Rama Reddi, Narosa Publishing House Pvt. Ltd, New Delhi
3. Power Electronics, Circuits Devices and Applications by Mohammad H. Rashid
4. Power Electronics by PC Sen
5. Power Electronics by Dr. PS Bhimbira, Khanna Publishers, New Delhi
6. Industrial Electronics & Control by SK Bhattacharya & S Chatterji, New Age international Publications(P) Ltd, New Delhi
7. Power Electronics by SK Sahdev, Uneek Publication, Jalandhar
8. Industrial Power Electronics by JC Karhava, King India Publication,
9. Fundamentals of Electrical Drives by Gopal K Dubey, Narosa Publishing House Pvt. Ltd, New Delhi
10. Power Electronics and Controls by Samir K Datta, Prentice Hall of India, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1	Introduction of SCR	16	25
2	Controlled Rectifiers	10	15
3	Inverters, Choppers, Dual Converters	18	30
4	Thyristor Control of Electric Drives	15	20
5	Uninterrupted power supplies	5	10
	Total	64	100

5.4 ENERGY SOURCES AND MANAGEMENT

L T P
4 - -

RATIONALE

Since the conventional energy resources are under fast depletion, it is high time to tap the non-conventional energy sources also. So, the solution primarily lies in tapping all possible energy generation sources but efficient use of available energy is also important. The electrical and electronics engineering diploma holders must be made aware about saving and conserving electrical energy and tackle the problems of environmental pollution as they will have to face this challenge in future life. Hence the subject.

DETAILED CONTENTS

1. Introduction: (6 hrs)
Various energy sources, importance of non-conventional sources of energy, present scenario, future prospects and economic criteria
2. Solar Energy: (10 hrs)
Principle of conversion of solar radiation into heat, photo-voltaic cell, electricity generation. Application of solar energy like solar water heaters, solar furnaces, solar cookers, solar lighting, solar pumping.
3. Bio-energy: (8 hrs)
Bio-mass conversion technologies- wet and dry processes. Methods for obtaining energy from biomass. Power generation by using gasifiers
4. Wind Energy and Hydro Energy (8 hrs)
Wind energy conversion, windmills, electricity generation from wind- types of wind mills, local control, energy storage
5. Geo-thermal and Tidal Energy: (8 hrs)
Geo-thermal sources, ocean thermal electric conversion, open and closed cycles, hybrid cycles. Prime movers for geo-thermal energy conversion. Steam Generation and electricity generation.
6. Magneto Hydro Dynamic (MHD) Power Generation (02 hrs)
7. Chemical Energy Sources: (10 hrs)
Design and operating principles of a fuel cell, conversion efficiency, work output and e.m.f of fuel cells, applications.

8. Energy Conservation and Management (12 hrs)
- a) Need for energy conservation with brief description of oil and coal crisis.
 - b) Environmental aspects
 - c) Energy efficiency- its significance
 - d) Energy efficient technology an overview
 - e) Energy conservation in Domestic sector- Lighting, home appliances
 - f) Need for energy efficient devices
 - g) Energy conservation in Industrial sector- Motors, Industrial lighting, Distribution system, Pumps, Fans, Blowers etc.
 - h) Energy conservation in Agriculture sector, Tube-well pumps, diesel-generating sets, Standby energy sources.
 - i) Macro Level approach for energy conservation at design stage.

RECOMMENDED BOOKS :

1. Solar Energy – Principles of thermal collection and Storage SP Sukhatme, Tata McGraw Hill Publication, New Delhi.
2. Non-Conventional Energy Resources by RK Singal, SK Kataria and Sons, New Delhi
3. Solar Energy Utilization; GD Rai ; Khanna Publishers, New Delhi.
4. Reviews of Renewable Energy Sources, Vol. 3, Edited by MS Sodha, S.S. Mathur, MAS Malik, TC Kandpal ; Wiley Eastern Limited, New Delhi.
5. Renewable Energy Sources and Conversion Technology by NK Bansal, Manfred Kleemann, Michael Meliss, Tata McGraw Hill Publishing Co. Ltd New Delhi.
6. Energy Today and Tomorrow; Maheshwar Dayal; Publications Division, Ministry of Information and Broadcasting, Govt. of India, New Delhi.
7. Energy Technology (non-conventional, renewable and conventional) by S Rao and BB Parulekar, Khanna Publishers, New Delhi
8. Manual on Energy Efficiency at Design Stage prepared by CII Energy Management Cell.
9. Energy Conservation-case studies in ceramic industry, sugar industry, fertiliser industry, cement industry. Compilation of CII, Energy Management Cell.

INSTRUCTIONAL STRATEGY

The teacher should make the student s aware about the depletion of energy sources and the availability of alternate sources of energy their feasibility and limitations. The need for adopting

non-conventional energy sources should be made clear to students. While explaining the need and energy management, the teacher should give students home assignments based on energy conservation. The students should be made familiar with the energy efficient devices, various approaches to conserve energy, energy auditing procedure etc. Teacher must give practical application of these energy sources in nearby surrounding areas.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (hrs)	Marks Allocation (%)
1.	Introduction	6	10
2.	Solar Energy	10	15
3.	Bio-energy	8	10
4.	Wind Energy and Hydro Energy	8	10
5.	Geo-thermal and Tidal Energy	8	15
6.	Magneto Hydro Dynamic Power Generation	2	5
7.	Chemical Energy Sources	10	15
8.	Energy Conservation and Mgt.	12	20
	Total	64	100

5.5 DIGITAL COMMUNICATION SYSTEM

L T P
4 - 2

RATIONALE:

Digital communication systems are becoming increasingly attractive because of ever growing demand for data communication. Digital transmission offers data processing option and flexibility not available with analog transmission. This is technology group subject, which will enable student to comprehend facts, concepts and working principle of digital communication system. This subject familiarizes the student with information theory, measurement of information rate and capacity. This subject helps the student to understand the concept of various pulse modulations, Digital modulation techniques, coding methods and error control, multiplexing and multiple access techniques and S.S. modulation. The knowledge acquired by students will help them to apply it in various modern communication systems.

DETAILED CONTENTS

1. Introduction to Digital Communication (06 hrs)
Basic digital communication system, block diagram. Channel capacity-definition, Hartley's law, Shannon-Hartley theorem, Channel capacity equation. Advantages and disadvantages of digital communication.
2. Pulse Communication (10 hrs)
Introduction, comparison with Continuous Wave Modulation, advantages, Sampling theorem, Nyquist rate, aliasing, natural and flat top sampling. PAM, PWM, PPM definition, generation, block diagram, waveform analysis, and their comparison.
3. Pulse code modulation (10 hrs)
Block diagram of PCM transmitter and receiver, sampling quantization, quantization error, companding, inter symbol interference, Delta modulation- block diagram of DM, slope overload, granular noise. ADM, DPCM, block diagram and its working.
4. Digital Modulation (12 hrs)
ASK, FSK, PSK definition and waveforms, their transmitter and receiver block diagram and working, M-ary encoding. QPSK, QAM, DPSK block diagram of transmitter and receiver and working. Bandwidth for each modulation technique and their comparison.
5. Coding methods and Error control (10 hrs)
Baud rate, Bit rate. Line coding - unipolar, bipolar – NRZ, RZ, Manchester, Source coding, ASCII, EBCDIC and baudot code. Channel coding, Error, Causes of error and its effects, error detection and correction using parity, Hamming code and simple numerical.

6. Multiplexing and Multiple Access (08 hrs)
Need of Multiplexing, TDM, FDM, definition, block diagram and their comparison. Introduction to WDM. Access technique TDMA, FDMA, CDMA (only concepts), advantages of TDMA over FDMA.
7. Spread spectrum modulation (08 hrs)
Introduction, PN Sequence. Model of spread spectrum modulation system. Direct sequence spread spectrum signal. Frequency hop spread spectrum, slow frequency hopping, and fast frequency hopping. Application Spread spectrum modulation.

LIST OF PRACTICALS

1. To sample given signal and reconstruct it.
2. Generate PWM wave and observe the change in width of pulse.
3. To obtain an AM wave from reactance tube modulator/voltage controlled oscillator circuit and measure the frequency deviation for different modulating signals.
4. Generate Delta PCM output and demodulate it.
5. Generate ASK output for a given control signal and demodulate the same.
6. Generate FSK output for a given control signal and demodulate the same.
7. Generate PSK output for a given control signal and demodulate the same.
8. To investigate performance of QPSK and plot the lissajous pattern.
9. To investigate performance of QAM.
10. Generate TDM output of applied four different channel inputs and demultiplex it.
11. Generate FDM and demultiplex it.

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

RECOMMENDED BOOKS

1. "Communication System"(Analog and Digital) by Sanjay Sharma, S.K.Kataria & Sons, New Delhi.
2. "Electronic Communication System Fundamentals through Advance"by Wayne Tomasi, Pearson Education, Noida.

3. "Digital & Analog Communication " by K. Sam. and Shanmugar, John Wiley & Sons, New Delhi.
4. "Digital Communication Fundamentals and Applications" by B. Sklar, Pearson Education, Noida.
5. "Communication System II" by Gurvinder Singh and others; India Publication House, Jalandhar.
6. "Communication System II" by Yogesh Chhabra; Eagle Parkashan, Jalandhar.
7. " Digital Communication" by Amitabha Bhattacharya, Tata McGraw Hill, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Sr. No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction to Digital Communication	06	5
2	Pulse Communication	10	15
3	Pulse code modulation	10	20
4	Digital Modulation	12	20
5	Coding methods and Error control	10	20
6	Multiplexing and Multiple Access	08	10
7	Spread spectrum modulation	08	10
	Total	64	100

5.6 COMPUTER NETWORKS

L T P
4 - 3

RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in computer engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

DETAILED CONTENTS

- | | | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1. | Networks Basics | (6 hrs) |
| | <ul style="list-style-type: none"> - What is network? - Models of network computing - Networking models - Peer-to –peer Network - Server Client Network - LAN, MAN and WAN - Network Services - Topologies - Switching Techniques | |
| 2. | OSI Model | (8 hrs) |
| | <ul style="list-style-type: none"> - Standards - OSI Reference Model - OSI Physical layer concepts - OSI Data-link layer concepts - OSI Networks layer concepts - OSI Transport layer concepts - OSI Session layer concepts - OSI presentation layer concepts - OSI Application layer concepts | |
| 3. | Introduction to TCP/IP | (10 hrs) |
| | <ul style="list-style-type: none"> - Concept of physical and logical addressing - Different classes of IP addressing, special IP address - Sub netting and super netting - IPV4 and IPV6 packet Format - Configuring IPV4 and IPV6 | |
| 4. | Protocol Suites | (3 hrs) |
| | <ul style="list-style-type: none"> - Models and Protocols - Network IPX/SPX - Intranet Protocols | |
| 5. | Network Architecture | (8 hrs) |
| | <ul style="list-style-type: none"> - ARC net specifications - Ethernet Specification and Standardization: | |

- 10 Mbps (Traditional Ethernet), 100 Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet), Introduction to Media Connectivity (Leased lines, ISDN, PSTN, RF, VSAT, Optical and IPLC)
6. Network Connectivity (6 hrs)
 - Network connectivity Devices
 - NICs
 - Hubs
 - Repeaters
 - Multiplexers
 - Modems
 - Routers and Protocols,
 - Firewall
 - ATM
 - VOIP and Net-to-Phone Telephony,
 - Laws and Protocols
 7. Network Printing (3 hrs)
 - Print Services
 8. Network Administration / Security (9 hrs)
 - Client/Server Technology
 - Server Management
 - RAID management and mirroring
 - Hauffman codes
 - Cryptography
 9. Network Trouble Shooting Techniques (6 hrs)
 - Trouble Shooting process
 - Trouble Shooting Tools: PING,IPCONFIG, IFCONFIG, NETSTAT, TRACEROOT, Wiresharp/ Dsniffer/ Pcop
 -
 10. Wireless Networking (05 hrs)

Basics of Wireless: Wireless MAN, Networking, Wireless LAN, Wi-Fi, WiMax(Broad-band Wireless) and Blue-Tooth technology.

LIST OF PRACTICALS

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11,BNC and SCST
3. Making of cross cable and straight cable
4. Install and configure a network interface card in a workstation.
5. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
6. Managing user accounts in windows and LINUX

7. Study and Demonstration of sub - netting of IP address
8. Use of Netstat and its options.
9. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
10. Installation of Network Operating System(NOS)
11. Visit to nearby industry for latest networking techniques

Required Software

- Windows Server/Linux Server

Required Tools and Supplies

- 1) Crimping tool, crone Tool, Cable tester,
- 2) RJ 45 Connectors, RJ-11, BNC, SCST
- 3) Coaxial Cable, UTP, STP, OFC cable
- 4) Screw Driver Kit
- 5) Switch/Hub
- 6) Manageable Switch

INSTRUCTIONAL STRATEGY

This subject deals with both theory and practicals. The students should be made to practically establish LAN with various hardware and software and their integration

RECOMMENDED BOOKS

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi
2. Data Communications and Networking by Forouzan, (Edition 2nd and 4th),Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Data and Computer Communication by William Stallings, Pearson Education, Sector 62, Noida
4. Local Area Networks by Peter Hudson
5. Understanding Local Area Network by Neil Jenkins
6. Area Networks by Stan Schatt, Prentice Hall of India, New Delhi
7. Network+ Lab manual, by Tami Evanson, BPB Publications, New Delhi-
8. Networking Essentials – BPB Publications, New Delhi
9. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
10. Linux – The complete Reference by Richard Peterson, Tata McGraw Hill Education Pvt Ltd, New Delhi.

11. Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.
12. Unleashed Linux by TechMedia Publishers, New Delhi
13. Computer Network by J.S. Katre, Tech-Max Publication, Pune

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Networks Basics	6	10
2	OSI Model	8	10
3	Introduction to TCP/IP	10	15
4	Protocol Suites	3	05
5	Network Architecture	8	15
6	Network Connectivity	6	10
7	Network Printing	3	05
8	Network Administration / Security	9	15
9	Network Troubleshooting Techniques	6	10
10	Wireless Networking	5	05
Total		64	100

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene