

Personnel Management and Industrial Relations

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATION

CREDITS - 03

1.Meaning, concept, function, & importance of personnel management, role of a personnel manager, personnel policies Need of a personnel policies, org anization of personnel Department (functional basis, service basis and chentile basis)

2. Manpower planning : Meaning & concept, need for manpower planning, types of manpower planning, meaning and concept of job analysis, job description & job specification, uses of job analysis information, Recruitment, selection meaning and steps of selection process, meaning of induction

3.Training and develop : Meaning, need & importance for training, method of training, development meaning of development, method of development.

4.Performance appraised :(a)Meaning, Objective, method of performance appraisal .

(b)Transfer : meaning objective, types.

(c) Promotion : Meaning , policies, basis of promotion.(Separation : Resignation, Discharge & Dismissal, Suspension & Retrenchment, Layoff.

5.Wages and salary administration :(a). Meaning purpose & principle of wage & salary administration, factors influencing wage & salary adminis tration.

(b).Meaning of wage &salary, minimum wage , fair wage& living , wage.

(c). Meaning of money and real wage.

(d). Methods of wage payment time rate & piece rate.

(e). Incentive Financial Incentive& non financial Incentive, method of wage paymen t based on result.

6.(a) Health, safety and welfare facilities.

(b)social security

(1)meaning and concepts, objective.

(2) form of social security social insurance & social assistance.

(c) Problem arising from diseas e , invalidity , accident, old age and unemployment.

7.(a).Industrial Relation : meaning & concept, changing concept of industrial relation, role played by the employer, trade union & government, current I. R. position in India, I.R. policies of government of India.

(b). Trade Union : Meaning and concept, objective, functions, type, method of trade union.

Reference Book :

1. Industrial relation, Trade Union & Labour Relation by G.P.Sinha & PRN Sinha, Pearson.

Computer Network

05 1x 13 COMPUTER NETWORKS L T P : 3 0 0 Credit : 3

1. Introduction : Network Hardware & Software, OSI Reference Model, TCP/IP Model, Comparison of the OSI & TCP/IP model.

2. The Physical Link layer : Guided Transmission Media, Physical Layer Standard.

3. The Data Link Layer : Need for Data Link Control, Service provided by the Data Link Layer, Frame Design Consideration, Flow control Mechanism, Data Link Error control, Error Control in Stop and wait Mechanism & Sliding Window Mechanism, Sequence num bering, Piggybacking Acknowledgements, Data Link Management.

4. MAC Protocols : Random access Protocols ALOHA.

5.IEEE 802.3 Ethernet : Contention Access, CSMA/CD, Physical Topology of Ethernet, Ethernet Repeater, Types of Ethernet.

6. Bridges and Layer 2 Switches : LAN Bridge, Transparent

Bridges, Spanning tree algorithm. Source routing bridge, route discovery in source routing, layer 2 Ethernet switches.

7. The network layer : network layer design issue, purpose of network layer, Functions of the Network Layer.

8. Introduction to Internet Protocol : IPv4 Format, ICMP.

9. Routing Algorithms : Static Routing, Dynamic Routing, Distance Vector Routing Algorithm, R outing Information Protocol, Link State Routing, OSPF Routing Protocol. Interior and Exterior Protocol, and Border Gateway Protocol.

10. Introduction to Transport Layer: TCP & UDP.

11. Introduction to Application Layer: TCP/IP Application Protocol.

Text Book:

1. Data Communication & Networking by Forouzan, Tata McGraw Hill.

2. Computer Network, 4e, by Andrew S. Tenenbaum, Pearson Education/ PHI.

3. Data Communication and Computer Networks, by Prakash C.Gupta, PHI.

4. Networking Ali in one Desk Reference by Doug Lowe, Wiley Dreamtech

Reference Books:

1. Computer Networking: A Top Down Approach featuring the Internet, 3e by James F.Kurose.

2. Computer Network by Godbole, Tata McGraw Hill.

3. Computer Networking, by Stanford H. Rowe, Marsha L. Schuh

Multimedia Technology and Application

MULTIMEDIA TECHNOLOGY AND APPLICATION

CREDITS - 03

1.Introduction : Multimedia today, Impact of Multimedia, Multimedia Systems, Components a nd its Applications.

2.Text and Audio : Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode,

Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Soun d (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI.

3.Image and Video : Image: Formats, Image Colour Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording formats and Standards (JPEG, MPEG, H.261) Transmissi on of Video Signals, Video Capture and Computer based Animation.

4.Synchronization : Temporal relationships, synchronization accuracy specification factors, quality of service.

5.Storage models and Access Techniques : Magnetic media, optical media, file systems (traditional, multimedia)

6.Multimedia devices : Output devices, CD ROM, DVD, Scanner, CCD

7.Image and Video Database : Image representation, segmentation, similarity based retrieval, image retrieval by colour, shape and texture: Indexing k d tre es, R trees, Quad trees; Case Studies : QBIC, Virage, Video Contentquerying, video segmentation, indexing.

8. Document Architecture and Content Management : Content Design and Development, general Design Principles.

9.Hypertext : Concept, Open Document A rchitecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing, Case study of Application.

10.Multimedia Application: Interactive television, Video on demand, Video Conferencing, Educational demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Reference Books :

1. Multimedia Literacy by Fred Hoffsteller, McGraw Hill.

 Multimedia Funda mentals : Vol. 1 Media Coding and Content Processing by Ralf Steinmetz and Klara Hahrstedt, PHI.
 Multimedia in Practice : Technology and Application by J. Jeffcoate,

PHI.

4. Multimedia Communications by Fred Halsall, Pearson Ed.

Power electronic controlled drives

Power Electronic Controlled Drives

CREDITS - 04

Unit 01 : Electrical Drives

A. Definition, Advantages of electrical drives, Components of Electric drive system, Types of Electrical Drives (DC and AC).
B. Motor-Load Dynamics, Speed Torque conventions and multi quadrant operation, Equivalent values of drive parameters. Load Torque Components, Nature and classification of Load. Constant Power operation of a Drive. Steady state stability, Numerical based on motor load dynamics.

Unit 02 : DC Motor Drives

A. Braking methods: Rheostatic, Plugging, and Regenerative. Closed loop control of drives: current limit control, torque control and speed control.

B. Single phase and three phase fully controlled converter drives and performance of converter fed separately excited DC Motor for speed control operations.

Chopper controlled drives for separately excited and series DC Motor operations. Numerical based on above. Closed loop speed control of DC motor below and above base speed.

Unit 03 : Induction motor Drives I

Braking methods: DC Dynamic Braking, AC Rheostatic braking, Plugging, Regenerative Braking, V/f control and comparison with stator voltage control, voltage source inverter (VSI) control, Steady State Analysis. Current source inverter (CSI) control-open and closed loop, Regenerative braking and multiquadrant operation of Induction motor drives, relative merits and demerits of VSI and CSI for induction motor drives, Numerical on VSI and CSI fed I.M. drives.

Unit 04 : Induction Motor Drives II

A. Principle of vector control, Block diagram of Vector control of induction motor. Servo mechanism in drives and block diagram for position control (Descriptive treatment only).

B. Thermal model of motor for heating and cooling, classes of motor

duty, types of enclosures for motor.

Unit 05 : Synchronous motor Drives

Types of motor, cylindrical rotor wound field motor, equivalent circuit, speed torque characteristics and effect of power factor, salient pole wound field motor, phasor diagram, simple numerical based on above, closed loop speed control of self controlled synchronous motor drives fed from VSI and CSI.

BLDC drives, block diagram and speed torque characteristics.

Unit 06 : Industrial application

A. Specific requirement and choice of drives for following applications.

- 1. Machine tools
- 2. Textile mills
- 3. Steel rolling mills
- 3. Sugar mills
- 4. Traction drives
- 5. Crane and hoist drives
- 6. Solar and battery powered drives

Switch gear and protection

Switch gear and Protection

CREDITS - 03

Unit - 1

Fundamentals of protective relaying

Need for protective system, nature and causes of fault, types of faults, effects of faults, evolution of protective relaying, classification of relays, zones of protection, primary and backup protection, essential qualities of protective relaying. Trip circuit of circuit breaker, zone of protection. Various basic operating principles of protection- over current, (current graded and time graded), directional over current, differential, distance, induction type relay, torque equation in induction type relay, current and time setting in induction relay, Numericals on TSM , PSM and operating time of relay

Fundamentals of arc interruption

Ionization of gases, deionization, Electric arc formation, Current interruption in AC circuit breaker, high and low resistance principles, arc interruption theories, arc voltage, recovery voltage, derivation and definition of restriking voltage and RRRV, current chopping, interruption of capacitive current, resistance switching, Numerical on RRRV, current chopping and resistance switching.

Unit - 3

Circuit Breaker

Different ratings of circuit breaker (like rated voltage, rated current, rated frequency, rated breaking capacity – symmetrical and unsymmetrical breaking, making capacity, rated interrupting duties, rated operating sequence, short time rating). Classification of high voltage circuit breaker. Working and constructional features of ACB, SF6 VCB- advantages, disadvantages and applications. Auto reclosing.

Unit - 4

A) Static and Digital Relaying

Overview of Static relay, block diagram, operating principal, merits and demerits of static relay. Numerical Relays :-Introduction and block diagram of numerical relay, Sampling theorem, Anti –Aliasing Filter, Block diagram of PMU

B) 3 Phase Induction Motor Protection

Abnormal conditions and causes of failures in 3 phase Induction motor, single phasing protection, Overload protection, Short circuit protection.

Unit - 5

A) Transformer Protection

Types of faults in transformer, Percentage differential protection in transformers, Restricted E/F protection, incipient faults, Buchholz relay, protection against over fluxing, protection against inrush current,

B) Alternator Protection

Various faults in Alternator, abnormal operating conditions- stator faults, longitudinal percentage differential scheme and transverse percentage differential scheme. Rotor faults-abnormal operating conditions, inter turn fault, unbalance loading, over speeding, loss of excitation, protection against loss of excitation using offset Mho relay, loss of prime mover.

Unit - 6

Transmission line protection

Over current protection for feeder using directional and non directional over current relays, Introduction to distance protection, impedance relay, reactance relay, mho relay and Quadrilateral Relays, Introduction to PLCC, block diagram, advantages, disadvantages, three stepped distance protection, Effect of arc resistance, and power swing on performance of distance relay. Realization of distance relays(impedance, reactance, and mho relay) using numerical relaying algorithm(flowchart, block diagram), Introduction to Wide Area Measurement (WAM) system.

Power System Operation and Contr<mark>o</mark>l

403141: Power System Operation and Control

Credits Theory :03 Practical :01

Unit 01 : Power System Stability

Introduction to stability, dynamics of synchronous machine, swing equation, power angle equation and curve, types of power system stability (concepts of steady state, transient, stability), equal area criterion, applications of equal area criterion (sudden change in mechanical input, effect of clearing time on stability, critical clearing angle, short circuit at one end of line, short circuit away from line ends and reclosure), solution of swing equation by point by point method, methods to improve steady state and transient stability, numerical based on equal area criteria.

Unit 02 : Reactive Power management

Necessity of reactive power control, reactive power generation by a synchronous machine, effect of excitation, loading capability curve of a generator, compensation in power system: series and shunt compensation using capacitors and reactors, Problems with Series Compensation, synchronous condenser.

Unit 03 : FACTs Technology

Problems of AC transmission system, evolution of FACTs technology, Working principle, circuit diagram, VI characteristics, applications, advantages and limitations of SVC, TCSC, STATCOM and UPFC.

Unit 04 : Automatic Generation and Control (AGC)

Concept of AGC, complete block diagram representation of loadfrequency control of an isolated power system, steady state and dynamic response, control area concept, two area load frequency control. Schematic and block diagram of alternator voltage regulator scheme.

Unit 05 : Economic Load Dispatch and Unit Commitment

A. Economic load dispatch: Introduction, revision of cost curve of thermal and hydropower plant, plant scheduling method, equal incremental cost method, method of Lagrange multiplier (neglecting transmission losses), Bmn coefficient, economic scheduling of thermal plant considering effect of transmission losses, penalty factor, procedure of load dispatch at state level load dispatch center, Regional Load Dispatch Center, numerical on penalty factor, exact coordination equation.

B. Unit commitment: Concept of unit commitment, constraints on unit commitment – spinning reserve, thermal and hydro constraints, methods of unit commitment – priority list and dynamic programming, Numerical on priority list method.

Unit 06 : Energy Control and Planning and Reliability of Power Systems

A. Energy Control: Interchange of power between interconnected utilities, economy interchange evaluation, interchange evaluation with unit commitment, types of interchange, capacity and diversity interchange, energy banking, emergency power interchange, inadvertent power exchange, power pools.

B. Planning and Reliability of Power Systems: Need of short term planning and long term planning in generation, transmission, distribution expansion. Definition of reliability of power system, Hierarchical levels for reliability study, Reliability evaluation of generation system, loss of load probability (LOLP), loss of load expectation (LOLE), Expected Energy Not Supplied (EENS), generation model, load model, risk model, composite system reliability evaluation, Distribution system reliability evaluation for radial and parallel system, customer oriented and energy based reliability indices.

Text Books:

[T1] I. J. Nagrath, D. P. Kothari, "Modern Power System Analysis", 4th Edition, Tata McGraw Hill Publishing Co. Ltd. (Edition 2)

[T2] Hadi Saadat, "Power System Analysis", Tata McGraw Hill

[T3] P. S. R. Murthy, "Power System Operation and Control", Tata McGraw Hill Publishing Co. Ltd.

[T4] P. S. R. Murthy, "Operation and Control in Power System", B. S. Publication.

[T5] R. Mohan Mathur, Rajiv K. Varma, "Thyristor based FACTs controller for Electrical

transmission system", John Wiley and Sons Inc.

[T6] Abhijit Chakrabarti, Sunita Halder, "Power System Analysis Operation and Control", Prentice Hall of India.

[T7] Narain G. Hingorani and Laszlo Gyugyi, "Understanding FACTS", IEEE Press.

Reference Books:

[R1] Allen J. Wood, Bruce F. Wollenberg, "Power Generation, Operation, and Control", Wiley India Edition.

[R2] "Electrical Power System Handbook", IEE Press.

[R3] Narain G. Hingorani, Laszlo Gyugyi, "Understanding FACTs Concepts and Technology of Flexible AC Transmission Systems," IEEE Press.

[R4] Olle I. Elgerd, "Electrical Energy System Theory", 2nd Edition, Tata McGraw Hill. Publishing Co. Ltd.

[R5] Prabha Kundur, "Power System Stability and Control", Tata McGraw Hill.

PLC and SCADA Applications

403142: PLC and SCADA Applications

Credits Theory :04 Practical :01

Unit 01 : Introduction to PLC

Role of automation in Industries, benefits of automation, Necessity of PLC, History and evolution of PLC, Definition as per NEEMA (National Electrical Engineering Manufacturers' Association), types – fixed/modular/dedicated, Overall PLC system, PLC Input and output modules (along with Interfaces), CPU, programmers and monitors, power supplies, selection criterion, advantages and disadvantages, specifications, comparison of various PLCs manufactured by Allen Bradley, Siemens, ABB, Mitsubishi, GE, Fanuc and Schneider.

Unit 02 : Interfacing of PLC with I/O devices

Input ON/OFF switching devices, Input analog devices, Output ON/OFF devices, Output analog devices Sensors-temperature, pressure, flow, level Actuators-Electrical, pneumatic, hydraulic Encoders-Incremental, Absolute Transducers, Limit switches, proximity sensors Control Elements- Mechanical, Electrical, Fluid valves

Unit 03 : Programming of PLC

Programming languages for PLC, Ladder diagram fundamentals, Rules for proper construction of ladder diagram Timer and countertypes along with timing diagrams, Reset instruction, latch instruction MCR (master control relay) and control zones Developing ladder logic for Sequencing of motors, ON OFF Tank level control, ON OFF temperature control, elevator, bottle filling plant, car parking, traffic light controller.

Unit 04 : Advance function and Applications of PLC

Analog PLC operation and PLC analog signal processing, PID principles, Typical continuous process control curves, simple closed loop systems, closed loop system using Proportional, Integral and Derivative (PID), PID modules, PID tuning, tuning methods including "Adjust and observe" method.

Motors Controls: AC Motor starter, AC motor overload protection, DC motor controller, Variable speed (Variable Frequency) AC motor Drive. PLC Applications in developing systems- Tank level controller using analog signals, temperature controller using RTD, speed control of electric motor.

Unit 05 : SCADA Systems

Introduction, definitions and history of Supervisory Control and Data Acquisition, typical SCADA system Architecture, important definitions HMI, MTU, RTU, communication means, Desirable Properties of SCADA system, advantages, disadvantages and applications of SCADA.

SCADA generations (First generation - Monolithic, Second generation - Distributed, Third generation - Networked Architecture), SCADA systems in operation and control of interconnected power system, Functions and features of SCADA systems, Automatic substation control, Energy management systems (EMS), System operating states, SCADA system in critical infrastructure: Petroleum Refining Process, Conventional electric power generation, Water Purification System, Chemical Plant.

Unit 06 : SCADA Protocols

Open systems interconnection (OSI) Model, TCP/IP protocol, Modbus model, DNP3 protocol, IEC61850 layered architecture, Control and

Information Protocol (CIP), Device Net, Control Net, Ether Net/IP, Flexible Function Block process (FFB), Process Field bus (Profibus).

Text Books:

[T1] John W. Webb, Ronald A. Reis, "Programmable Logic Controllers: Principles and Application", PHI Learning, New Delhi, 5th Edition
[T2] John R. Hackworth, Frederick D., Hackworth Jr., "Programmable Logic Controllers Programming Methods and Applications", PHI Publishers

[T3] Ronald L. Kurtz, "Securing SCADA System", Wiley Publishing [T4] Stuart A Boyer, "SCADA supervisory control and data acquisition", ISA, 4th Revised edition

[T5] Sunil S. Rao, "Switchgear and Protection", Khanna Publication [T6] Curtis Johnson, "Process Control Instrumentation Technology", Prentice Hall of India

[T7] Gary Dunning, "Introduction to Programmable Logic Controllers", Thomson, 2nd Edition

Reference Books:

[R1] Gordan Clark, Deem Reynders, "Practical Modern SCADA Protocols", ELSEVIER

[R2] Batten G. L., "Programmable Controllers", McGraw Hill Inc., Second Edition

[R3] Bennett Stuart, "Real Time Computer Control", Prentice Hall, 1988

[R4] Krishna Kant, "Computer Based Industrial Control", PHI [R5] P. K. Srivstava, "Programmable Logic Controllers with Applications", BPB Publications

Control System II

403145: Control System II

Credits Theory :03 Practical :01

Unit 01 : Digital Control System (06 Hrs)

Introduction, Configuration of the basic digital control system. Advantages and limitations of digital control; data conversion and quantization, Sampling and Reconstruction processes, Shannon's Sampling theorem, practical aspects of choice of sampling rate. Zero order hold (ZOH) and it's transfer function, Basic concepts and transfer function of first order hold.

Unit 02 : Z-transform and Pulse-transfer-function

Review of z-transform, Inverse z-transform, difference equations and solution using z transform method. Pulse transfer function and Z-transfer function, General procedure for obtaining Pulse-transfer-function, pulse transfer function of ZOH.

Unit 03 : Stability Analysis

Sampled data closed loop systems, characteristic equation, causality and physical realizability of discrete data system, realization of digital controller by digital programming, direct digital programming, cascade digital programming, parallel digital programming. Mapping between S-plane and Z-plane, stability analysis of closed loop system in z-plane using Jury's test, Bilinear Transformation.

Unit 04 : Introduction to state space analysis

Important definitions – state, state variable, state vector, state space, state equation, output equation. State space representation for electrical and mechanical system, nth order differential equation and transfer function. Conversion of transfer function to state model and vice versa. State model of armature control DC motor

Unit 05 : Solution of state equations

Concept of diagonalization, eigen values, eigenvectors, diagonalization of system matrices with distinct and repeated eigen values, Vandermonde matrix.

Solution of homogeneous and non-homogeneous state equation in standard form, state transition matrix, its properties, Evaluation of STM using Laplace transform method and infinite series method Cayley Hamilton theorem.

Unit 06 : Design of Control System Using State Space Technique:

Concept of controllability and observability, controllability and observability Tests, condition for controllability and observability from the system matrices in Canonical form, Jordan canonical form, effect of pole zero cancellation on the controllability and observability of the system, duality property. Pole placement design by state variable feedback. Necessity of an observer, design of full order observer.

Text Books:

[T1] K. Ogata, "Discrete Time Control System", 2nd Edition, PHI Learning Pvt. Ltd. 2009

[T2] Benjamin C. Kuo "Digital Control System", Prentice Hall of India Pvt. Ltd. [T3] J. Nagrath, M. Gopal "Control System Engineering", 5th Edition. New Age International Publishers

[T4] R.Anandanatarajan and P.Ramesh Babu "Control System Engineering",4th Edition, SCITECH Publications, India Pvt. Ltd.

Reference Books:

[R1] K. Ogata, "Modern Control Engineering", Prentice Hall of India Pvt. Ltd.

[R2] M. Gopal, "Digital Control and State Variable Methods", Tata McGraw-Hill.

[R3] M. N. Bandyopadhyay, "Control Engineering – Theory and Practice", Prentice Hall of India Ltd. Delhi.

Information Security

INFORMATION SECURITY

CREDITS - 03

1.Introduction, CRYPTO BASICS : Classic Crypto, Simple Substitution Cipher, Cryptanalysis of a simple substitution, Double Transposition Cipher, One time Pad, Project VENONA, Codebook Cipher.

2.SYMMETRIC KEY CRYPTO : Stream Ciphers, A5/1, RC4, B lock Ciphers, Fiestel Cipher, DES, Triple DES, AES.

3.PUBLIC KEY CRYPTO : Knapsack, RSA, Diffie Hellman, Uses for Public Key Crypto.

4.HASH FUNCTION :

AUTHENTICATION :Authentication Methods, Keys versus Passwords, Biometrics, Two Factor Authentication. **AUTHORIZATION :**Access Control Matrix, Multilevel Security Models, Firewalls, Intrusion Detection.

5.SOFTWARE FLAWS AND MALWARE : Software Flaws, Malware, Miscellaneous Software Based Attacks.

6.OPERATING SYSTEM AND SECURITY : Operating System Security Functions, Trusted Operating System, Next Generation Secure Computing Base.

Reference Books :

1.Introduction to Computer Security by Bishop and Venkatramanayya, Pearson Education.

2. Cryptography and Network Security : Principles and Practice by Stallings, PHI.

Personnel Management and Industrial Relation

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATION

CREDITS - 03

1.Meaning, concept, function, & importance of personnel management, role of a personnel manager, personnel policies Need of a personnel policies, org anization of personnel Department (functional basis, service basis and chentile basis)

2. Manpower planning : Meaning & concept, need for manpower planning, types of manpower planning, meaning and concept of job analysis, job description & job specification, uses of job analysis information, Recruitment, selection meaning and steps of selection process, meaning of induction

3.Training and develop : Meaning, need & importance for training, method of training, development meaning of development, method of development.

4.Performance appraised :(a)Meaning, Objective, method of performance appraisal .

(b)Transfer : meaning objective, types.

(c) Promotion : Meaning , policies, basis of promotion.(Separation : Resignation, Discharge & Dismissal, Suspension & Retrenchment, Layoff.

5.Wages and salary administration :(a). Meaning purpose & principle of wage & salary administration, factors influencing wage & salary adminis tration.

(b).Meaning of wage &salary, minimum wage , fair wage& living , wage.

(c). Meaning of money and real wage.

(d). Methods of wage payment time rate & piece rate.

(e). Incentive Financial Incentive& non financial Incentive, method of wage paymen t based on result.

6.(a) Health, safety and welfare facilities.

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(1) meaning and concepts, objective.

(2) form of social security social insurance & social assistance.

(c) Problem arising from diseas ${\rm e}$, invalidity , accident, old age and unemployment.

7.(a).Industrial Relation : meaning & concept, changing concept of industrial relation, role played by the employer, trade union & government, current I. R. position in India, I.R. policies of government of India.

(b). Trade Union : Meaning and concept, objective, functions, type, method of trade union.

Reference Book :

1. Industrial relation, Trade Union & Labour Relation by G.P.Sinha & PRN Sinha, Pearson.

Mobile Communication

Mobile Communication(404189)

Unit I : Telecommunication Switching & Traffic 8L

Telecommunication switching: Message switching, Circuit switching, Manual System,

Electronic Switching. Digital switching: Switching functions, Telecommunication Traffic: Unit of

Traffic, Traffic measurement, A mathematical model, Lost- call systems: Theory, traffic

performance, loss systems in tandem, traffic tables. Queuing systems: Erlang Distribution,

probability of delay, Finite queue capacity, Systems with a single server, Queues in tandem,

delay tables and application of Delay formulae.

Unit II: Switching Networks and Signaling 8L

Single Stage Networks, Gradings, Link Systems, Grades of service of link systems. Time

Division Switching: Space and time switching, Time division switching networks,

Synchronization, Call processing Functions, Common Control, Reliability, Availability and

Security. Signaling: Customer line signaling. FDM carrier systems, PCM signaling, Inter-register

signaling, Common channel signaling principles, CCITT signaling No. 6, CCITT signaling No.

7, Digital customer line signaling.

Unit III: Cellular Concepts6L

Evolution of Wireless systems, Introduction to cellular telephone system, Frequency reuse,

Channel Assignment, Handoff strategies, Cell Splitting, Propagation Mechanism: Free space

loss, Reflection, Diffraction, Scattering. Fading and Multipath: Small scale multipath

propagation, Impulse response model of multipath channel. Multiple Access Techniques-TDMA,

FDMA, CDMA

Unit IV: First and Second Generation Mobile Systems6L

First Generation Cellular Systems, AMPS, GSM Cellular Telephony: Introduction, Basic GSM

Architecture, Basic radio transmission parameters in GSM system, Logical Channels, GSM time

hierarchy, GSM burst structure, Description of call setup procedure, Handover, Modifications

and derivatives of GSM.

Unit V: GSM Services 8L

GSM Physical layer: Speech Coding and decoding, GMSK modulation, Data transmission in

GSM: Data Services, SMS, HSCSD, GPRS, EDGE.

Unit VI : CDMA Based Mobile Systems 8L

Motivation for CDMA use, Spreading Sequences, Basic Transmitter and Receiver schemes,

Rake Receiver, IS-95 system: Frequency Range, Downlink transmission, Uplink transmission,

Power control, Introduction to 3G mobile systems: W-CDMA and cdma-2000.

Text Books

 J. E. Flood , "Telecommunications Switching, Traffic and Networks", Pearson Education
 Krzysztof Wesolowski, "Mobile Communication Systems", Wiley Student Edition.

Reference Books

1. Theodore S Rappaport, "Wireless Communications Principles and Practice" Second

Edition, Pearson Education

2. John C. Bellamy, "Digital Telephony", Third Edition; Wiley Publications

3. ThiagarajanVishwanathan, "Telecommunication Switching Systems and Networks"; PHI

Publications

4. Wayne Tomasi, "Electronic Communications Systems"; 5th Edition; Pearson Education

5. Vijay K Garg, Joseph E Wilkes, "Principles and Applications of GSM" Pearson

Education

6. Vijay K Garg, Joseph E Wilkes, "IS-95CDMA and CDMA 2000 Cellular/PCS Systems

Implementation" Pearson Education

7. Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press

Broadband Communication Systems

Broadband Communication Systems(404190)

UNIT I: Light wave System Components

Key Elements of Optical Fiber Systems, Optical Fibers as a Communication Channel: Optical Fiber Modes and Configurations, Mode Theory for Circular Waveguides, Single-mode Fibers, Gradedindex Fiber Structure, Signal Degradation in Optical Fibers.Optical Sources: Basic Concepts and characteristics of LEDs and LASERs. Photodetectors: Basic Concepts, Common Photodetectors.

UNIT II: Lightwave Systems

System Architectures, Point-to-Point Links: System Considerations, Design Guidelines: Optical Power Budget, Rise Time Budget, Long-Haul Systems.

UNIT III: Multichannel Systems

Overview of WDM, WDM Components: 2 x 2 Fiber Coupler, Optical Isolators and Circulators, Multiplexers and De-multiplexers, Fiber Bragg Grating, FBG applications for multiplexing and De-multiplexing function, Diffraction Gratings, Overview of Optical Amplifiers: SOA, EDFA and RFA in brief.

UNIT IV: Orbital Mechanics and Launchers

History of Satellite Communication, Orbital Mechanics, Look angle determination, Orbital perturbations, Orbital determination, Launchers and Launch Vehicles, Orbital effects in communication system performance.

UNIT V: Satellites

Satellite Subsystems, Attitude and control systems (AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystems, Satellite antennas, EquipmentReliability and space qualification.

UNIY VI: Satellite Communication Link Design

Introduction, Basic transmission Theory, System Noise Temperature and G/T Ratio, Design of Downlinks, Satellite Systems using Small Earth Stations, Uplink Design, Design specified C/N : Combining C/N and C/I values in Satellite Links, System Design Examples

Text Books

1. Gerd Keiser, "Optical fiber Communications", Tata McGraw Hill, 4th edition.

2. Timothy Pratt, Charles Bostian, Jeremy Allnutt "Satellite Communications", John Wiley & Sons.

Reference Books

1.Govind P. Agrawal, Fiber-Optic Communication Systems, Wiley, 3rd edition.

2. Dennis Roody, "Satellite Communications", McGraw Hill

VLSI Design & Technology

VLSI Design & Technology (404181)

Unit I: VHDL Modeling

Data objects, Data types, Entity, Architecture & types of modeling, Sequential statements, Concurrent statements, Packages, Sub programs, Attributes, VHDL Test bench, Test benches using text files. VHDL modeling of Combinational, Sequential logics & FSM, Metastability.

Unit II: PLD Architectures

PROM, PLA, PAL: Architectures and applications. Software Design Flow. CPLD Architecture, Features, Specifications, Applications. FPGA Architecture, Features, Specifications, Applications.

Unit III: SoC& Interconnect

Clock skew, Clock distribution techniques, clock jitter. Supply and ground bounce, power distribution techniques. Power optimization. Interconnect routing techniques; wire parasitic, Signal integrity issues. I/O architecture, pad design. Architectures for low power.

Unit IV: Digital CMOS Circuits

MOS Capacitor, MOS Transistor theory, C-V characteristics, Non ideal I-V effects, Technology Scaling. CMOS inverters, DC transfer characteristics, Power components, Power delay product. Transmission gate. CMOS combo logic design. Delays: RC delay model, Effective resistance, Gate and diffusion capacitance, Equivalent RC circuits; Linear delay model, Logical effort, Parasitic delay, Delay in a logic gate, Path logical efforts.

Unit V: Analog CMOS Design

Current sink and source, Current mirror. Active load, Current source and Push-pull inverters. Common source, Common drain, Common gate amplifiers. Cascode amplifier, Differential amplifier, Operational amplifier.

Unit VI: Testability6L

Types of fault, Need of Design for Testability (DFT), Testability, Fault models, Path sensitizing, Sequential circuit test, BIST, Test pattern generation, JTAG & Boundary scan, TAP Controller.

Multimedia Technology and Application (Elective)

MULTIMEDIA TECHNOLOGY AND APPLICATION

CREDITS - 03

1.Introduction : Multimedia today, Impact of Multimedia, Multimedia Systems, Components a nd its Applications.

2.Text and Audio : Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer Representation of Soun d (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI.

3.Image and Video : Image: Formats, Image Colour Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording formats and Standards (JPEG, MPEG, H.261) Transmissi on of Video Signals, Video Capture and Computer based Animation.

4.Synchronization : Temporal relationships, synchronization accuracy specification factors, quality of service.

5.Storage models and Access Techniques : Magnetic media, optical media, file systems (traditional, multimedia)

6.Multimedia devices : Output devices, CD ROM, DVD, Scanner, CCD

7.Image and Video Database : Image representation, segmentation, similarity based retrieval, image retrieval by colour, shape and texture: Indexing k d tre es, R trees, Quad trees; Case Studies : QBIC, Virage, Video Contentquerying, video segmentation, indexing.

8. Document Architecture and Content Management : Content Design and Development, general Design Principles.

9.Hypertext : Concept, Open Document A rchitecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing, Case study of Application.

10.Multimedia Application: Interactive television, Video on demand, Video Conferencing, Educational demand, Video Conferencing, Educational Applications, Industrial Applications, Multimedia archives and digital libraries, media editors.

Reference Books :

1. Multimedia Literacy by Fred Hoffsteller, McGraw Hill.

2. Multimedia Funda mentals : Vol. 1 Media Coding and Content

Processing by Ralf Steinmetz and Klara Hahrstedt, PHI.

3. Multimedia in Practice : Technology and Application by J. Jeffcoate, PHI.

4. Multimedia Communications by Fred Halsall, Pearson Ed.

Wireless & Mobile Communication

Wireless & Mobile Communication

Evolution of mobile radio communication fundamentals.

General Model of Wireless Communication Link, Types of Signals, Cellular Infrastructure, Cellular System Components, Antennas for Cellular Systems

Cellular System Components, Antennas for Cellular Systems, Operation of

Cellular Systems, Channel Assignment, Frequency reuse, Channel Assignment

strategies, Handoff Strategies Cellular Interferences, Sectorization; Wireless

Channel and Radio Communication, Free Space Propagation Model, Channel

Noise and Losses, Fading in Land Mobile Systems, Multipath Fading, Fading

Effects on Signal and Frequency, Shadowing.

Wireless Channel Modeling: AWGN Channel, Rayleigh Channel, Rician

Fading Channel, Nakagami Fading Channel, Ocumura and Hata Path Loss

Model; Channel Modelling: Stochastic, Flat Fading, Wideband Time-Dispersive Channel Modelling.

Theory of Vocoders, Types of Vocoders; Spread Spectrum Modulation,

Pseudo-Noise Codes with Properties and Code Generation Mechanisms, DSSS

and FHSS Systems, Time Hopping and Hybrid Spread Systems; Multicarrier

Modulation Techniques. Zero Inter Symbol Interference Communication

Techniques, Detection Strategies, Diversity Combining Techniques: Selection

Combining, Threshold Combining, Equal Gain Combining, Maximum Ratio Combining; Spatial Diversity and Multiplexing in MIMO Systems, Channel

Estimation.

Equalization Techniques: Transversal Filters, Adaptive Equalizers, Zero

Forcing Equalizers, Decision Feedback Equalizers, and related algorithms.

Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA, SC-

FDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes,

RAKE Receiver; Multiple Access for Radio Packet Systems: Pure ALOHA,

Slotted ALOHA, CSMA and their versions; Packet and Pooling Reservation

Based Multiple Access Schemes.

GSM system for mobile Telecommunication, General Packet Radio Service,

Edge Technology; CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS,

Long Term Evolution (LTE), Mobile Satellite Communication, Introduction to

Mobile Adhoc Networks, Li-Fi Communication, Ultra-Wideband Communication, Mobile data networks, Wireless Standards IMT 2000,

Introduction to 4G and concept of NGN.

Satellite & RADAR systems

REC083 SATELLITE & RADAR SYSTEMS

I Elements of Satellite Communication, Orbital mechanics, look angle and orbit determination, launches and lauch vehicle, orbital effects, Introduction to geo- synchronous and geo-stationary satellites.

II Satellite sub-systems: Attitude and Orbit control systems, Telemetry, Tracking and command control system, Power supply system, Introduction to satellite link design, basic transmission theory, system noise temperature and G/T ratio, design of down link and uplink, design of satellite links for specified C/N, satellite data communication protocols.

III Direct broadcast satellite television and radio, satellite navigation and the global positioning systems, GPS position location principle, GPS receivers and codes, Satellite Signal Acquisition, GPS

navigation Message, GPS Signal Levels, Timing Accuracy, GPS Receiver Operation.

IV Introduction to radar, radar block diagram and operation, radar frequencies, Applications of radar, The Radar Equation: Detection of signals in noise, Receiver noise and the signal to noise ratio, Probabilities of detection and false alarm, Integration of Radar Pulses, Radar cross section of targets, Radar cross section fluctuations, Transmitter Power, Pulse Reception Frequency, Antenna Parameters, System Losses.

V Tracking Radar: sequential lobbing, conical scan, mono-pulse Tracking, low angle tracking, tracking in range. MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line cancellers, Staggered Pulse Reception Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

Text / Reference Books:

1. Merrill I. Skolnik "Introduction to Radar Systems", Mc Graw-Hill.

- 2. J.C.Toomay, Paul J. Hannen "Principles of Radar", PHI Learning.
- 3. B.Pratt, A.Bostian, "Satellite Communications", Wiley India.
- 4. D. Roddy, "Satellite Communications", McGrawhill Education.

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