K L University

Department of BIO - TECHNOLOGY

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

BIOPROCESS ENGINEERING
Syllabus

UNIT–I: Introduction to Bioprocess

An of overview of traditional and modern applications biotechnology industry, outline of an integrated bioprocess (upstream and downstream) with process flow sheet,steps in development of a complete bioprocess for commercial manufacture of recombinant-DNA derived product. -9 hrs

UNIT– II: Dimensions and system units

Basic Biochemical Calculations: atomic, molecular and equivalent weights. Molarity,Molality,Normality and partial pressures,laws of chemical combination, Definition ofstochiometry, Composition of mixtures and solutions, weight fractions, volumetriccomposition, Density and Specific gravity -9hrs 2

UNIT –III: Fermenation and Enzyme Processes

Aerobic and Anaerobic fermentation processes and their application in the biotechnology industry behavior of microbes in different reactors (air lift, batch,continuous ,fed batch condition). Production of enzymes in submerged and solidstate processes, extraction and purification of enzymes, methods of characterization,specific activity and activity definitions. -9hrs

UNIT–IV: Metabolic Stoichiometry and Energetics

Stoichiometry of cell growh and product formation; Elemental balances; degree of reduction of substrate and biomass.available electron balance; yield coefficients of biomass and product formation, maintenance coefficients, Energetic analysis of microbial growth and product formation; thermodynamic efficiency of growth -9hrs

UNIT – V: Kinetics of microbial growth and Product formation

Phases of cell growth in batch cultures, Simple unstructured kinetic models formicrobial growth, Monod model, Growth of filamentous organisms. Growthassociated (primary) and non-growth associated (secondary) product formation Kinetics. Leudeking-Piret models. -9hrs

Books:

(I) Textbook:
1. D.G.Rao, Introduction to Biochemical Engineering, McGraw-Hill, 2005.
2. Pauline and Doran , Bio Process Engineering Principles , Elsevier
(ii) Reference Book:
1. Bailey Ollis, Biochemical Engineering fundamentals, 2nd edition, McGraw-Hill, 1986.
2. M.L.Shuler and F. kargi Bioprocess engineering, Prentice Hall of India 1992

BIOPROCESS ENGINEERING
Model Paper

Time: 3 Hrs Max.Marks:100

Answer any five questions. All questions carry equal marks

1. Disscuss in brief about the outline of a integrated bioprocess with a process flow sheet

2. Production of Single Cell-Protein from hexadecane is described by the following equation

$$C_{16}H_{34} + a\,O_2 + b\,NH_3 \longrightarrow CH_{1.66}O_{0.27}N_{0.20} + dCO_2 + e\,H_2O$$

Where $CH_{1.66}O_{0.27}N_{0.20}$ represents the biomass if RQ=0.43, determine the stiochiometric coefficients

3. Discuss the production aspects of Cellulase and Xylanase using solid state fermentation .Differentiate between Solid state fermentation and submerged fermentation

4. Define the following

   I. Available electrons

   II. Degree of reduction

   III. Theoretical O_2 demand

   IV. Yield coefficient

5. Discuss the application of leudeking –piret model for a primary metabolite

6. Discuss a simple Unstructured kinetic model for microbial growth

7. Elucidate the growth kinetic aspects of steady state and unsteady state conditions in Continuous, fed batch and Batch Cultures.

8. Discuss the production of bacterial amylases and their characterization of kinetic parameters

BIOANALYTICAL TECHNIQUES
Common Paper
Syllabus

Unit I: ***Spectroscopy Techniques***
Buffers; Methods of cell disintegration; Enzyme assays and controls; Detergents and membrane proteins; Dialysis, Ultrafiltration and other membrane techniques UV, Visible and Raman Spectroscopy; Theory and application of Circular Dichroism; Fluorescence; MS, NMR, PMR, ESR and Plasma Emission spectroscopy

Unit II: ***Chromatography Techniques***
TLC and Paper chromatography; Chromatographic methods for macromolecule separation – Gel permeation, Ion exchange, Hydrophobic, Reverse-phase and Affinity chromatography; HPLC and FPLC; Criteria of protein purity

Unit-III: ***Electrophoretic techniques***
Theory and application of Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2D Electrophoresis; Disc gel electrophoresis; Gradient electrophoresis; Pulsed field gel electrophoresis

Unit IV : ***Centrifugation***
Basic principles; Mathematics & theory (RCF, Sedimentation coefficient etc); Types of centrifuge - Micro centrifuge, High speed & Ultracentrifuges; Preparative centrifugation; Differential & density gradient centrifugation; Applications (Isolation of cell components); Analytical centrifugation; Determination of molecular weight by sedimentation velocity &
sedimentation equilibrium methods.

Unit V: ***Advanced Techniques***
Protein crystallization; Theory and methods; API-electrospray and MALDI-TOF; Mass spectrometry; Enzyme and cell immobilization techniques; DNA & Peptide Synthesis and sequencing.

Texts:
1. Freifelder D., Physical Biochemistry, Application to Biochemistry and Molecular Biology, 2nd Edition, W.H.
2. Freeman & Company, San Fransisco, 1982.
3. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press, 2000.
References
1. D. Holme & H. Peck, Analytical Biochemistry, 3rd Edition, Longman, 1998.
2. R. Scopes, Protein Purification - Principles & Practices, 3rd Edition, Springer Verlag 1994.

BIOANALYTICAL TECHNIQUES (Common Paper)

Model Question Paper

Maximum marks: 100 Time: 3 hours

Answer any five questions from the following representing at least one from each unit.
Each question carries 20 marks.

1. Outline the physical, Chemical and Mechanical procedures that could be of interest in the disintegration of cells.

2. With the help of a neat and labeled sketch explain the principle and applications of

HPLC.

3. Differentiate between preparative and analytical centrifugation and thereby explain the construction and working of an analytical ultracentrifuge.

4. List the various components necessary for an electrophoretic set up and then describe the process involved in separation of plasma proteins by 2D electrophoresis..

5. Describe in detail MALDI- TOF.?

6. Explain the following with reference to Nucleic acids (2X10=20)

A. Stationary and mobile phases in Chromatographic techniques

B. Density gradient centrifugation.

7. Outline the principle, instrumentation and applications of mass spectrometry in peptide sequencing.

8. Outline the theory and explain the principle and application of Circular Dichroism.

Down Stream Processing
Syllabus

Scope: The aim of this paper is to provide the scientific knowledge for isolation, purification and characterization of bioproducts from their mixed state or from biological systems. It also emphasizes themerits and demerits while operating different instruments during the separation of Biomolecules.

UNIT-I: Down Stream Processing

In BiotechnologyOverview of bioseparations, Characterization of Biomolecules, characterization of Bioprocess,characterization of fermentation broth: Morphology of cells, structure of the cell wall, productconcentrations, Biomass density, Rheological Behavior of fermentation broth.

UNIT– II: Primary Separation And Recovery Processes

Recovery of intracellular products: Cell disruption methods-physical methods (osmotic shock, grindingwith abrasives, solid shear, liquid shear) – chemical methods (alkali, detergents)- enzymatic methods. Removal of suspended solids: Foam separation, filtration. Filtration equipment, centrifugation, tubularbowl centrifuge, disk. Bowl centrifuge, basket centrifuge, scale up of centrifuges.

UNIT– III: Product Enrichment Operations

Membrane based separations – Classification & characteristics of membrane separation, merits of theprocess. Micro filtration, ultra filtration, Reverse osmosis, dialysis & electro dialysis. Selection ofmembrane, operational requirements of membrane. Retention coefficient, concentration factor, permeateyield & solid yield in membrane separation processes. Membrane modules: Plate & Frame, hollow fiber,spiral wound, shell & tube, cross flow micro filtration. Aqueous two-phase extraction process: Applications of aqueous two-phase extraction, reversed micelles extraction principle, micellar structures, critical micelle concentration. Protein solubilization,limitation of reversed micelles. Precipitations of proteins with salts and organic solvents, kinetics ofprotein aggregation.

UNIT– IV: Product Purification

Chromatographic Separations: Classification of chromatographic techniques, column chromatography,elusion frontal displacement techniques, partition coefficient, retention time and volume, capacity factor,column efficiency, design and scale up of chromatography. Principles & practices of Gel Filtration, IonExchange and Affinity chromatography.

UNIT – V: Alternative Separation Methods and Product Polishing

Super critical extraction: principles of SCE, Flow scheme of a simple SCE system. Formulation strategies: Importance of formulation, formulation of beakers yeast, Enzymes, formulation of pharmaceutical products. Polishing: Crystallization, Principles of crystallization and equipment. Principles of drying and lyophilization, Freeze dryer.

Recommended Textbooks

Butterworth and Heinmann. Product recovery in bioprocess Technology-Biotol series,
B.Siva Sankar Bioseperations.

References Books:

Harvey Blanch. Biochemical Engineering
Christie J.Geankoplis., Transport processes and Unit operations.

Down Stream Processing
Model Question Paper

Time: 3hrs Max Marks: 100

1. Answer all the following questions. Each question carries 2Marks.

   a. Microfiltration
   b. Tangential flow filtration principle
   c. Log p octanol
   d. Relative centrifugal force
   e. Partition coefficient
   f. Cationic surfactant with example
   g. Rheological Consistency index
   h. Protein purity index
   i. Methyl polysiloxane
   j. Gel filtration chromatography

Answer any four questions. 4 X 20 = 80M

2. Discuss various interactions selectivity and stationary phases used in capillary columns used in gas chromatography.

3. Elucidate various principles and mechanisms involved in operation of freeze dryer, freeze thawing & super critical extraction of products.

4. Describe various methods involved in characterization and purification of therapeutic proteins

5. Classify various membrane separation techniques and discuss the mechanisms involved in filtration mechanisms.

6. Discuss various formulation strategies in food & pharmaceutical industry.

7. Classify various lipid components in lower organisms and justify the separation technology involved quantification of lipid classes.

Applied Bioinformatics
Syllabus

Scope: The Course aims to prepare the students for understanding biological data at molecular level from both informational and biological perspective and impart conceptual, computational and practical skills to acquire, analyze, process or use the data to address significant problems in the field of Bioinformatics, of both pure and applied nature.

Unit – I: Comparative Genomics
Genetic mapping, Physical mapping, SNPs, ESTs, GSS, Gene prediction methods, Gene prediction tools, Gene annotation, Molecular Predictions with DNA sequence, Human Genome Project.

UNIT – II: Protein Structure Prediction and Evaluation methods
Structure of Protein – PDB, MMDB; Ramachandran Plots; Structure visualization – Rasmol; Methods of Structure prediction – Homology modeling - SPDBV, Threading, Ab-initio method; Structure Evaluation– DSSP, ProCheck, Verify 3D; Structure comparison.

UNIT – III: Protein Identification And Interactions
Proteomics approaches for protein analysis; Protein identification Programs – Mascot, GFS; Comparative Proteomics methods; Protein interactions; Protein Interaction dbs – GRID, MINT; Network Mapping; Biological Pathway dbs – EcoCyc, KEGG; Pathway prediction; Metabolic pathway reconstruction.

UNIT – IV: Gene Expression Analysis
Introduction; Serial Analysis of Gene Expression; Microarray, Types of Microarrays, Microarray Fabrication, Microarray hybridization and detection, Microarray Image Processing and analysis, Expression ratios, Transformations of the Expression ratio, Data Normalization.

UNIT – V: System Biology
Foundations of System Biology- Objectives of System Biology-Strategies relating to In Silico Modeling of biological processes- Metabolic Networks- Signal Transduction pathways, Gene Expression patterns –Applications of System Biology Markup Language (SBML), E-cell, V-cell simulations and Applications.

Recommended Textbooks:
G. Gibson and SV Muse, A Primer of Genome Science, Second Edition - Sinauer Associates, Inc.
CW Sensen, Essentials of genomics and Bioinformatics, Wiley-VCH publication.

Reference textbooks:
Speed T. (ed.) Statistical analysis of gene expression microarray data (CRC, 2003)

Applied Bioinformatics

Model Question Paper

Time: 3hrs Max Marks: 100
Answer any five questions: 5 x 20 = 100

1. Explain various strategies used for mapping genome sequences. Justify your answer by using appropriate examples as and when required from Human genome project.

2. Describe all the basic steps involved in Homology modeling of proteins.

3. Give a detailed account of major databases used in Biological pathways.

4. Write an explanatory note on the principle and methodology used in Serial Analysis of Gene Expression.

5. Explain various strategies involved in Insilico modeling of biological process.

6. Write in detail about types of Microarrays, Microarray Fabrication, Microarray hybridization and detection.

7. Explain various strategies associate with protein interaction studies

8. Explain various applications associated with signal transduction pathways.

Plant Biotechnology
Syllabus

Scope – This course helps in an in-depth understanding of basic and advanced techniques in Plant biotechnology.

Unit-1 : An Overview of Plant Biotechnology

Totipotency, Media, types of media used, media composition, nutritional variations, cell nutrition, cyto differentiation, invitro growth parameters, contamination and recalcitrance, invitro cultivation methods, molecular farming.

Unit – 2: Organogenesis, Caulogenesis and Rhizogenesis

Descriptive understanding of invitro grown plantlets showing disease- resistant, herbicide tolerant and induction of environment sustainance. Direct and indirect methods of regeneration Suspension cultures,Somaclonal and gametoclonal variations and Genetic stability

Unit - 3 : Secondary Metabolite production & Germplasm conservation

Plant secondary metabolites, commercial production using appropriate media supplements viz., elicitors, growth factors, stress factors, defense proteins, precursors and anti-metabolites. Cryo preservation exsitu and insitu methods, freezing, thawing and drying and cryoprotectors.

Unit – 4: Genetic Transformation & Molecular breeding

Protoplast isolation, culture and fusion technique, protoplast induced transformation, Target cells for transformation, methods of gene transfer, selectable marker genes, reporter genes, screenable genes, Agrobacterium mediated transformation, histo chemical assay,transgenic plants, Plant DNA finger printing, RAPD, RFLP, PCR studies in plants with a focus on molecular assisted selection.

Unit – 5: Plant Bioinformatics

New approaches to scientific research with computers, Information and communication technologies (ICT model systems), genomics (functional and structural), proteomics, molecular bioinformatics, chemi informatics and their applications in Plant improvement.

Plant Biotechnology

Model Question Paper

Time: 3hrs Max Marks: 100
Answer any five questions 5 x 20 = 100

(Draw diagrams wherever necessary)

1. Give a detailed account of invitro growth parameters adopted during molecular farming?

2. Enumerate the conceptual idea of genetic stability with a focus on cell culture systems?

3. Describe the methodology of secondary metabolite production using plant bio reactors?

4. Write short notes on the following:

    a. Cryo preservation b. Thawing c. Drying

5. Explain the protocol for agrobacterium – mediated transformation.

6. Write a note the following:

    a. Reporter genes b.Marker genes c. Histochemical assay

7. Explain the applications of PCR in plant improvement.

8. Elucidate the role of different ICT model systems used in crop improvement?

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Department of CHEMISTRY

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

Basic Organic Chemistry

UNIT I- Purification and drying of organic solvents

Benzene, toluene, xylene, Tetrahydrofuran, chloroform, dichloromethane, methanol, dimethyl formamide, dimethylsulfoxide,

UNIT –II- Preparation of Reagents:

Sodium methoxide, TMEDA-$ZnCl_2$ Complex, Lithium diisopropylamide, Butyl Lithium, organomagnesiumhalide, wittig reagent, sodamide, dialkyllithiumcuprate. Oxidising agents, Reducing agents.

UNIT-III- Reactive intermediates

Carbanions, carbocations, carbenes, carbon radicals, nitrenes, arynes,

UNIT-IV- Named reactions and rearrangements

Benzoin condensation, Perkin reaction, Cannizaro reaction, Diels Alder reaction, Heterodiels alder reaction, Peterson olefination, Wolf Kishner reduction, Claisen rearrangement, Cope rearrangement, Oxycope rearrangements, Benzidine rearrangement, Beckman rearrangement.

UNIT- V- Chromatographic techniques:

Principles & applications with respect to Thin-Layer chromatography, Paper chromatography, Column chromatography, Gas Chromatography and HPLC with suitable examples & Chromatograms

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Advances in Organic Chemistry

Unit-I

Structural Elucidation by Spectroscopic Methods: Application of UV, IR and NMR spectroscopy, mass spectroscopy in structural analysis of organic compounds.

Unit-II

Oxidation: Oxidation of hydrocarbons; alkenes, alcohols, aldehydes and ketones Oxidative coupling reactions. Use of $Pb(OAC)_4$, NBS, CrO_3, SeO_2, MnO_2, $KMnO_4$, OsO_4, Per acids and Ti(III) Nitrate.

Reduction: Catalytic hydrogenation (homogenous and heterogeneous), reduction by dissolving metals, reduction by hydride transfer reagents, reduction with hydrazine and diamide

Unit-III

Disconnection approach: Introduction, Principle, Functional group inversion, Disconnection of mono cyclic substituted organic Compounds.

Unit-IV

Phase Transfer catalyst: Principle & applications of three catalysts: Tetra butyl Ammonium bromide, Crown ethers, Ethyl Triphenyl Phosphonium Bromide.

Unit- V

Design Organic Synthesis: Retro synthesis the disconnection approach – basic Principles Convergent and linear synthesis with examples; Retro synthesis of bi cyclic and tri cyclic systems.

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Physical Chemistry

Unit-1: Photochemistry:

Types of Photochemical reactions; Laws of Absorption (Grothuss-Draper law & Einstein's law); Quantum yield; Primary & Secondary Photochemical processes; Joblonski Diagram: Fluorescence, Phosphorescence, Inter-System Crossing; Internal Conversion-Vibrational Cascade and Chemiluminescence. Kinetics of Photochemical reactions; Dissociation of HI; Reaction between Hydrogen and Chlorine; Reaction between Hydrogen and Bromine; Reaction between Hydrogen and Oxygen; Explosion limits.

Unit-2: Catalysis:

Types of Catalytic Reagents; Types of Catalysis (Homogeneous and Heterogeneous catalysis); Catalytic activity; Acidity Functions; Theory of Homogeneous catalysis; Theory of Heterogeneous catalysis (Chemical theory & Adsorption theory); Kinetics of heterogeneous reactions.

Unit-3: Enzyme Catalysis:

Specificity in Enzyme Catalyzed reactions; Michaelis - Menten mechanism; Influence of Concentration on Enzyme-Catalyzed reactions; Influence of Temperature on Enzyme Catalyzed reactions; Acid-base catalysis.

Unit-4: Quantum Mechanics:

Introduction to Quantum Mechanics: Postulates of Quantum Mechanics; Schrödinger wave equation; Physical significance of wave function; Eigen values and Eigen functions; Particle in a box (one dimensional) behavior; Normalization; Orthogonality; Degeneracy.

Unit-5: Chemical Kinetics:

Fast reactions; Rate constants of fast reactions; Their determination by Stopped flow method, Relaxation method, Flash photolysis and Nuclear Magnetic Resonance methods.
Ionic reactions; Influence of solvent on the rate of reactions (single & double sphere A.C. model); Primary salt effect; Secondary salt effect; Influence of frequency factor; Influence of ionic strength.

Unit-6: Surface Chemistry:

Adsorption; Factors influencing adsorption; Surface area and its measurements; Adsorption isotherm curves; Langmuir's adsorption isotherm- its limitations; B.E.T. Adsorption isotherm-its applications; Negative adsorption; Positive adsorption; Chemisorption; Physisorption and Determination of surface area.

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Analytical Chemistry

Unit- I: Basic separation techniques- I:

Theory and Techniques of distillation, fractional distillation, steam distillation, vaccum distillation,Molecular distillation and sublimation. Theory of action of drying agents, Fractionation by evaporation-working of Rotory film evaporator. Extraction – Distribution law and derivation, solvents and their choice. tenchniques batch and continuous, multiple extraction, column and their choice.

Unit-II: Basic separation techniques -II:

Complexation-Theory and application of complexating agents and choice Dialysis – Theory, membranes and their choice, techniques and applications. Ultrafilteration and zone filteration – principles and techniques Centrifugation –Principle, Techniques , Ultra centrifuge-description of apparatus, theory, sedimentation velocity and molcecular weight determination.

Unit-III: Basic chromatographic techniques:

Chromatographic methods- theroy, principle, classification and mechanism-adsorption, partition, ion exchange, ion association, gel permeation and molecular sieving Column chromatography – Construction and operation of column, choice of adsorbents and eluents, techniques of elution, methods of detection, analytical and industrial applications. Paper chromatography – Construction and operation of column, choice of separation, types of papers and their choice, different techniques, qualitative measurements, source of errors in analytical and industrial applications. Thin Layer chromatography – Techniques and applications, Modified stationary phases. Ion – exchange chromatography – Techniques and applications.

Unit-IV: Advanced chromatographic techniques:

Gas chromatography – Types and nature of stationary and mobile phase, solid supports and their choice, columns – packed, open and capillary, sampling methods instrumentation, detectors – types sensitivity, limits of detection operative principles of TCD, FID and ECD, Comparison of detectors temperature programming, derivative chromatography, hyphenated techniques with GSGC qualitative and quantitative applications. (P.T.O) Gel permeation chromatography – Instrumentation, heterogeneity factor, determination of molecular weights - weight average and number average, analytical and industrial applications. Liquid chromatography – High pressure liquid chromatography. Theory and equipment, type of pumps and their choice, types of columns, large scale separation, application in analytical chemistry and in industry.

Unit-V: Advanced analytical tools:

New development in chromatography – Plasma chromatography, super critical fluid chromatography.

Electrophoresis-Theory and classification, factors affecting mobility, macromolecular size and charge interactions with supporting electrolyte, pH and concentration discontinuities, Factors affecting electrophoresis phenomena-electrolysis, electrosomosis, temperature and supporting media. Instrumentation, methodology, Preparation of gel- staining and destaining, preparative zone electrophoresis, continuous electrophoresis and Applications.

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ADVANCED INSTRUMENTAL METHODS FOR CHEMICAL

CHARACTERIZATION AND ANALYSIS

UNIT-1: Absorption Spectroscopy:

Introduction and importance; Principles and instrumentation; Interferences - Chemical & Spectral and evaluation methods; Applications of Atomic Absorption Spectroscopy for qualitative and quantitative analysis. UV-Visible spectroscopy: Theory, Rules and identification of functional groups Chiroptical spectroscopy-CD, ORD curves, applications to organic molecules. Problems related to UV and ORD curves.

UNIT-2: IR, FT-IR and Raman spectroscopy:

Introduction; basic principles; Instrumentation; Detectors, Qualitative, Quantitative analysis and Applications. Raman spectroscopy –identification of some organic functional groups.
Solving some problems related IR and Raman spectroscopy.

UNIT-3: Nuclear magnetic resonance spectroscopy:

High resolution NMR – chemical shift- Spin-Spin splitting (j-value) Spin decoupling ; spin tickling, shift reagents; structure determination, applications of proton NMR and problems ^{13}C NMR –Principle, rules, applications and problems ^{2}D NMR – Principle, COSY (HETCOR, HOMCOR) DQFCOSY, DEPT, INEPT, NOESY, INADEQUATE, HMBC,HMQC and problems.(P.T.O)

UNIT-4: Mass Spectroscopy and allied techniques:

Introduction; Basic principles, ionizing sources, types of ions, detectors and applications. Rules, modes of fragmentation of various organic molecules and problems. Principle and applications of GC-MS, HPLC-MS, GC-FTIR

UNIT-5: X-ray fluorescence and Thermal Analysis:

Principle, energy dispersive X-ray fluorescence, wavelength dispersive X-ray fluorescence, X-ray photo electronic spectroscopy, chemical shift, application of XPES and XRF. Principles, basic instrumentation and applications of TG, DTA and DSC. differential scanning calorimetry. Cyclic voltametry – Principle, instrumentation and applications.

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ADVANCED CLOUD COMPUTING
SYLLABUS

UNIT-1

Cloud Computing : Overview, Applications, Intranet and the Cloud, First Movers on the cloud, the need for Cloud Computing, Benefits of cloud Computing, Limitations of the Cloud Computing, security concerns and regulatory issues, over view of different cloud computing applications which are implemented, Business case for implementing a Cloud

UNIT-II

Cloud Computing Technologies: Hardware and Infrastructure: Clients, Security, Network, services Accessing the Clouds: Platforms, WEB applications, WEB APIS, WB Browsers Cloud Storage: Overview, Storage provides, Cloud Standards: Applications, Client, Infrastructure, Services

UNIT-III

Cloud Computing Mechanisms: Software as a service: Overview, Driving Forces, Company offerings, Industries, Software + services: Overview, Mobile Device Integration, Providers, Microsoft Online Application development: Google, Microsoft, Intuit Quick base, Cast Iron Cloud, Bungee Connect, Development Platforms: Google, Sales Force, Azure, Trouble shooting, Application management

UNIT-IV

Local Clouds: Virtualization, server solutions, Thin Clients Migrating to the clouds: Cloud services for individuals, Mid-market, and Enterprise wide, Migration, best practices, analyzing the service

UNIT V (BOOK-2)

Using Cloud Services: Collaborating on Calendars, Schedules, and Task Management, Collaborating on Event management, Collaborating on Contact management, collaborating on Project Management, Collaborating on Word Processing, Collaborating on Spread sheets, Collaborating on Databases, Collaborating on presentations, Storing and sharing Files and other online content, sharing Digital Photographs, controlling the collaborations with Web-Based Desktops Online Collaborations: Collaborating Via WEB based communication Tools, Collaborating Via Social Networks and Groupware, collaborating Via Blogs and Wikis.

TEXT BOOK:

1. Cloud Computing a practical approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter , Tata McGraw-HILL,2010 Edition
2. Cloud Computing-web Based application that change the way you work and collaborate online, Michael Miller, Pearson Eduction,2009 Edition
Reference Book:
"Cloud Computing for Dummies" by Judith Hurwitz , Bloor Robin, Marcia Kaufman & Fern Halper, November 2009.

ADVANCED CLOUD COMPUTING
Model Question Paper

Time: 3hrs Max Marks:100

Answer any five questions

1. Illustrate Cloud Computing Applications and Limitations of Cloud Computing
2. Give the implementation of cloud in a business case.
    (a) Elaborate the cloud computing Technologies.
    (b) Write a note on cloud standards.
3. Distinguish how software as a service differs from Software + services.
4. Give an explanation on mobile device integration.
5. List out the various development platforms and explain.
    (a) How the virtualization can be implemented in local clouds.
    (b) How do analyzing the service on migrating to the clouds.
6. Illustrate the collaborating on event management and on project management with a neat Sketch.
7. Give an explanation on storing and sharing files and sharing digital photographs.
8. Illustrate Collaborating Social Networks and Group Ware and Blogs and Wikis

ADVANCED SOFTWARE ENGINEERING

Syllabus

Unit-I

The Software Process – Process Models, Agile Development

Unit-II

Modeling, Principles that guide practice, understanding requirements, requirements modeling, scenarios, information, and analysis classes, requirements modeling, design concepts, architectural design, component level design, user-interface design, pattern based design, Web app design

Unit- III

Quality Management, Quality concepts, review techniques, software quality assurance, software testing strategies, testing conventional applications, testing object oriented applications, testing web applications, formal modeling and verification, software project management, project metrics

Unit-IV

Managing software projects, project management concepts, process and project metrics, estimation of software metrics, project scheduling, risk management, maintenance and reengineering

Unit – V

Software process improvement, emerging trends in software engineering

Text Book

Roger S Pressman "Software Engineering A Practitioner's Approach" Seventh Edition 2010

Reference Book

Ian Somerville- "Software Engineering 9" Addision Wesley 9th Edition

ADVANCED SOFTWARE ENGINEERING

Model Question Paper

Time: 3 hrs Max Marks: 100

Answer any five questions

1.

a. Explain Evolutionary Process models

b. Differentiate Component based model and formals method model

2. Discuss Lean software development and agile software models

3.

a. What are the various approaches for requirements modeling? Explain

b. Explain the Architectural design in detail.

4.

a. What are the basic principles involved in designing class based components?

b. What are the models for interface analysis and design? Explain

5.

a. What is the difference between content architecture and web App architecture? Discuss

b. Explain the statistical Software Quality Assurance.

6.

a. Explain Basis path testing with an example

b. What are the various methods in testing object oriented software? Discuss

7.

a. Explain Clean room software engineering approach.

b. Explain version management and change management in software configuration.

8.

a. What are different metrics for architectural design? Explain.

b. Discuss the elements of Software Process improvement (SPI) framework

COMPUTER NETWORKS
SYLLABUS

UNITI

Introduction: OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.Physical Layer : Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT-II

Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

UNIT–III

Dynamic routing – Broadcast routing. Rotary for mobility. Congestion, Control Algorithms – General Principles – of Congestion prevension policies. Internet working: The Network layer in the internet and in the ATM Networks.

UNIT–IV

Transport Layer: Transport Services, Connection management, TCP and UDP protocols; ATM AAL LayerProtocol.

UNIT – V

Application Layer – Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS :

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

COMPUTER NETWORKS
MODEL QUESTION PAPER

Time: 3hrs Max Marks: 100

Answer any FIVE of the following

1) What is OSI reference model? Explain?

2) What is guided media? Explain about various types of guided media available?

3) a) How do you implement hierarchical routing ?

b) What are the advantages and disadvantages of flooding?

4) a) What is distance vector routing? Explain its drawbacks?

b) Explain about tunneling?

5) What are Non-adaptive and adaptive routing algorithms? Explain.

6) a) Discuss about ATM network in detail?

b) Define IP address and explain about mobile IP?

7) Write short notes on the following

(a) WWW (b) LAN (c) DNS (d) Network layer

8) Write a short note on the following:

(a) SNMP (b) MAN (c) Internet (d) Bridge

JAVA AND WEB TECHNOLOGIES
SYLLABUS

Unit I:
HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script, CSS

Unit II:
XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX Review of Applets, Class, Event Handling, AWT Programming.
Introduction to Swing: JApplet, Handling Swing Controls like Icons – Labels – Buttons – Text Boxes – Combo – Boxes – Tabbed Pains – Scroll Pains – Trees – Tables Differences between AWT Controls & Swing Controls Developing a Home page using Applet & Swing.

Unit III:
Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizes, Java Beans API.
Web servers: Tomcat Server installation & Testing.

Introduction to Servelets: Lifecycle of a Servelet, JSDK The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters.

Unit IV:
More on Servlets: The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues. Introduction to JSP: The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC architecture. AJAX.

Unit V:
JSP Application Development: Generating Dynamic Content, Using Scripting Elements
Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations Database Access Database Programming using JDBC Studying Javax.sql.* package Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page

TEXT BOOKS:
1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT 1,2)
2. The complete Reference Java 2 Fifth Edition ,Patrick Naughton and Herbert Schildt., TMH (Chapters: 25) (UNIT 2,3)
3. Java Server Pages –Hans Bergsten, SPD O'Reilly (UNITs 3,4,5).

Java and web Technologies

Model Question Paper

Answer any five questions…

Max marks : 5 X 20 =100

1. A)What is Cascading style sheet? What are its uses?
   B) Prepare cascading style sheet for a webpage which contains list and table with other suitable content?
2. a) What is the purpose of Java script ?

   b) Develop any two java scripts functions for the mouse events for a reasonable

   html form?
3. Using XML schemas, generate a DOM tree for the data of your choice?
4. Differentiate AWT controls and Swing controls? With the help of java delegation

   model

   develop a program structure among swing components?
5. What do you mean by persistence in java beans? Explain the architecture of Java

   beans?
6. What is the servlet life cycle? Develop a servlet with all standard methods?
7. What are the differences between servlets and Java server pages? Write a JSP

   program for the interactive web page?
8. Explain the architecture of Java database connectivity? What are java methods

   Available for the DML commands of SQL?

Neural Networks and Fuzzy Logic

Syllabus

Intelligent systems and soft computing: Intelligence systems, Knowledge-based systems, knowledge representation and processing, soft computing. Fundamentals of Fuzzy Logic Systems: Fuzzy sets, Fuzzy logic operations, generalized operations, Fuzziness and fuzzy resolution, relations, composition and interface, considerations of fuzzy decision- making. Fuzzy logic control: Basics of fuzzy control, Fuzzy control architecture, Properties of fuzzy control, robustness and stability. Fundamentals of **artificial neural networks:** Learning and acquisition of knowledge, features of Artificial neural networks, fundamentals of connectionist modeling. Major classes of neural networks: The multi-layer perceptrons, radial basis function networks, Kohonen's self-organizing network, The Hopfield network, industrial and commercial application of ANN. Dynamic neural networks and their applications to control and chaos **prediction:**Training algorithms, fields of applications of RNN, dynamic neural networks for identification and control, neural network–based control approaches, dynamic neural networks for chaos time series, Artifical neural networks for chaos predictions. Neuro Fuzzy Systems: Architecture of Neuro fuzzy systems, construction of Neuro fuzzy systems. Evolutionary computing: Over view of Evolutionary computing, Genetic algorithms and optimization, the schema theorem: the fundamental algorithm of Genetic algorithms, operations, integration of Genetic algorithms with neural networks, integration of Genetic algorithms with fuzzy logic, known issues in Genetic algorithms, population-based incremental learning, ES applications

Textbooks:

Fakhreddine O. Karry, Clarence De Silva, "Soft Computing and Intelligent systems Design Theory, Tools and Applications", Pearson, 2009

Reference Books:

S N Sivanandam, S N Deepa, "Principles of Soft Computing", Wiley India,2008
Laurene Fausett, "Fundamentals of Neural Networks", Pearson, 2004.
Timothy J Ross "Fuzzy Logic with Engineering Applications", 3rd Edition, Wiley, 2010.
Bart Kosko, "Neural Networks and Fuzzy Systems", PHI, 2004

Neural Networks and Fuzzy Logic
Model Question paper

Note: Answer Any Five of the following Max marks : 5 X 20 =100
All Questions Carry equal Marks

1) What is an Expert System? What are performance goals of the next generation expert systems? Discuss whether fuzzy logic is appropriate for use in an expert system.

2) a) Define the following terms as applied to fuzzy logic:

1) Projection

2) Cylindrical Extension

3) Join

4) Composition

What is the significance of the composition operation in fuzzy decision making?

b) List five consumer appliances that use fuzzy logic. Indicate how fuzzy logic is used in each of these appliances?

3) Discuss briefly about robustness and stability of fuzzy systems?

4) Briefly explain about backpropagation learning algorithm? Write the applications and limitations of MLP Neural Networks

5) Briefly explain about radial basis function networks along with its applications?

6) Briefly explain about Artificial Neural Networks for Chao's prediction.

7) Briefly explain about construction of neuro-fuzzy systems

8) Briefly explain about Genetic Algorithm operators i.e., Selection, Crossover and mutation with some examples.

DATA MINING CONCEPT & TECHNIQUES

SYLLABUS

UNIT – I

Introduction : Data mining, kinds of data mined, kinds of patterns mined, technologies used: statistics, Machine learning, Database systems and Data Warehousing, Information Retrieval, Major issues in Data Mining: Mining methodology, User Interaction, Efficiency and Scalability, Diversity and database types, Data Mining & society.

UNIT – II

Data Preprocessing: Overview, Data cleaning, Data Integration, Data Reduction, Data Transformation, Data cleaning: Missing Values, Noisy data, Data cleaning as a process. Data Integration: Entity identification problem, Redundancy and Correlation Analysis, Tuple duplication, Data value conflict detection and Resolution. Data Reduction: Overview, wavelet transforms, Principle components Analysis, Attribute subset selection, Regression and log-linear models, Histograms, clustering, sampling, Data cube Aggregation. Data Transformation and Data Discretization by Binning, Discretization by Histogram Analysis, Discretization by cluster, Decision Tree and correlation Analysis, concept Hierarchy generation for Nominal data.

UNIT – III

Data Warehousing and Online Analytical Processing: Basic concepts of Data Warehouse, Differences between Operational Database Systems and Data Warehouses, Why have a separate Data Warehouse?, Data Warehousing: Multithreaded Architecture, Data Warehouse Models: Enterprise Warehouse, Data Mart and Virtual Warehouse, Extraction, Transformation and Loading, Metadata Repository. Data Warehouse Modeling: Data Cube and OLA, Data Cube: A Multidimensional data Model, Stars, Snow Flakes and Fact Constellations. Schemas for Multidimensional data models, Dimensions: the Role of concept Hierarchical Measures, Typical OLAP operations, A Star net Query Model for Querying Multidimensional Databases. Data warehouse Design and Usage: a Business Analysis Framework for Data warehouse design, Data Warehouse design process, Data warehouse usage for Information processing, From Online Analytical processing to Multidimensional Data warehouse. Data Warehouse Implementation: Efficience Data Cube computation, Indexing OLAP Data, Efficient processing of OLAP Overview, OLAP Server Architecture.

UNIT – IV

Mining Frequent Patterns, Association and Correlations: Basic Concepts, Frequent itemset Mining methods: Apriori Algorithm, Generate Association rules from Frequent itemsets, Improving the efficiency of Apriori, A pattern-growth approach for mining frequent itemsets, using frequent itemset using Vertical data format, Mining closed and max. patterns. Pattern Evaluation Methods, Advanced Pattern Mining: A Road map, Pattern mining in Multilevel, Multidimensional space, Constraint Based Frequent Mining, Classification: Basic Concepts, Decision Tree induction, Bayes Classification Method, Rule based Classification, Model evaluation & selection, techniques to improve classification accuracy. Classification Advanced Methods: Bayesian Belief networks, Classification by Back Propagation, Support Vector Method, Classification using frequent Patterns, lazy learners, other classification methods. Cluster Analysis: Basic Concepts & Methods, Cluster Analysis, partitioning methods, Hierarchical Methods, Density based Methods, Grid based Methods, Evaluation of Clustering. Advanced Cluster Analysis: Probabilistic Model based Clustering, Clustering High Dimensional Data, Clustering Graph & Network data, Clustering & Constraints.

UNIT – V

WEB MINING: Information Retrieval and Web Search: Basic Concepts, IR Models, Boolean, Vector Space, Statistical Language Model Evaluation measures, Text and Web page Preprocessing, stop word removal, stemming, web page processing, Duplicate detection, Inverted Index and its compression, latent semantic indexing, web search, Meta search: combining Multiple Ranking, Web Spamming, Link Analysis: social network analysis, Cocitation & Bibliographic Coupling, Page Rank, HTS, Community Discovery. Web Usage Mining: Data Collection and Preprocessing, sources and types of data, key elements of web usage data preprocess, data modeling for web usage mining discovery and analysis of web usage patterns: session and visitor analysis, cluster analysis, Association and Correlation Analysis, analysis of sequence & navigational patterns, classification and prediction based on web user transaction

BOOKS

Data Mining Concept & Techniques, Jiawei Han|Micheline Kamber|Jian Pei, 3rd Edition, M K Publishers.
Web Data Mining, Bing Liu, Springer International Edition.

REFERENCES

Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management by Gordon S. Linoff and Michael J. Berry (Apr 12, 2011)

Data Mining: A Tutorial Based Primer by Richard Roiger and Michael Geatz (Oct 6, 2002)

DATA MINING CONCEPT & TECHNIQUES
Model Question Paper

Time : 3hrs Max Marks:100

Answer any five questions

1) a) What is Data warehouse? Explain architecture of data warehouse.
   b) Explain OLAP operations in multidimensional data model

2) a) Explain architecture of Data Mining System.
   b) What is Rule Based Classifier? How it works

3) a) Explain Nearest Neighbor Classifier Algorithm?
   b) Explain maximal margin classifier?

4) a) What do you mean by association analysis? Explain Apriori algorithm for frequent item set generation.
   b) What is FP-Tree? How it is represented ? Draw FP Tree for the following data set.

TID	Items
1	{a,b}
2	{b,c,d}
3	{a,c,d,e}
4	{a,d,e}
5	{a,b,c}
6	{a,b,c,d}
7	{a}
8	{a,b,c}
9	{a,b,d}
10	{b,c,e}

5) a) Write short notes on Evolution of association patterns.
   b) What is meant by clustering? Explain various types of clusters.

6) a) Explain K-means algorithm.
   b) Explain DBSCAN clustering algorithms.

7) a) Explain applications of data mining.
   b) What are the social impacts of Data Mining?

8) a) Explain Information Retrieval Models in web mining?
   b) Explain the following in Web Usage Mining
   i) Types of data ii)data modeling iii) cluster analysis iv) classification and prediction

K.L.University
Pre-Ph.D Examination
Wireless Communication
SYLLABUS

UNIT-1

Basics: Evolution of Mobile Communication, Mobile Radio systems. Examples of Wireless Communication Systems: Paging, Cordless, and Cellular, Comparison of Common Wireless Communication systems, Trends in Cellular Radio and personnel Communication

Fundamental of Transmission: Signals for Conveying Transmission, Analog and Digital Data Transmission, Channel capacity, Transmission Media, Multiplexing

Communication Networks: Type of Networks - LAN, MAN, WAN, Switching Techniques, Circuit Switching, Packet switching, Asynchronous Transfer Mode, wireless local loop, wireless local-area networks, Bluetooth networks, Personal area networks

Protocols and the TCP/IP: The need for protocol architecture, The TCP/IP Protocol Architecture, the OSI Model, Inter Networking

UNIT-II

Wireless Communication Technology – Part-1

Cellular wireless Networks – Principles, First generation - Analog, Second Generation – Evaluation, TDMA Standards (HSCSD-GSM, GPRS-GSM, GPRS-IS136, EDGE-GSM, EDGE-IS139) CDMA Standards (IS-95B), Third Generation systems and Standards (CDMA(UMTS, cdma2000), SCDMA(3GTD), Frequency re use, Channel assignment strategies, Handoff Strategies, Interference and system capacity, Trucking and grade of service, Improving coverage and capacity(cell splitting, Sectoring, Repeaters for range extension, A micro cell zone Concept)

Antennas and wave propagation: Introduction Radio wave Propagation, Free space propagation model, relating power to Electric fields Antennas, wave propagation modes (Reflection, Ground Reflection, Diffraction, and Scattering), line of sight transmission, fading in the mobile Environment: Fading due to multipath Time Delay Spread and Doppler speed). Outdoor Propagation models: Longley-Rice Model, Durkin's Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Wolfish and Bertoni Model, wideband PCS Microcell Model. Indoor Propagation Models: Partition losses in the same floor, Partition losses between the floors, long distance Path Loss Model, Ericson Multiple Break point Model, Attenuation Factor Model, signal penetration into buildings, Ray tracing and site specific modeling. Multipath Channels: Propagation(small scale fading, Doppler effect, Impulse response model (relationship between bandwidth and receiver power), measurements (Direct RF Pulse System, Spread spectrum Sliding Correlator Channel sounding), Mobile Multipath Channels(Time dispersion Parameters, Coherence Bandwidth, Doppler Spread and coherence Timing).

UNIT-III

Wireless Communication Technology – Part-1

Wireless Link Design: Path Access Models – Long Distance Path Loss Models, Log-Normal Shadowing, determination of percentage of coverage Area

Wireless Link Improvement Techniques: Introduction, Equalization(Fundamentals of equalization, Training A generic Equalizer, Equalizers in a communication receiver, Equalization Techniques, Linear equalizers, Non Linear equalization, Algorithms for adaptive Equalization, Fractionally spaced equalizers, diversity Techniques, RAKE receiver, Interleaving, Channel coding, Block Codes and Finite Fields, Convolution Codes, Coding Gain, Trellis Coded Modulation, turbo codes, Automatic repeat requests

Multiple Access in wireless systems: Fundamentals of Multiple access, Frequency domain multiple access (FDMA), Time Division Multiple Access (TDMA), Spread spectrum Multiple Access, Space division Multiple Access(SDMA), Packet Radio Access(Pure ALOHA, Slotted ALOHA), carrier sense Multiple Access(CSMA) protocols, Reservation Protocols (Reservation ALOHA, Packet reservation Multiple access (PRMA), Capture effect in Packet Radio, Capacity of Cellular systems(CDMA capacity, Capacity of CDMA with Multi cells, Capacity of Space division Multiple Access), Collision avoidance

UNIT IV

Wireless Communication Technology – Part-2

Wireless Networking

Basics of wireless Networking: Introduction, Difference between Wireless and Fixed Telephone network, Generation of wireless networks(First, second and third), fixed network Transmission hierarchy, **Traffic Routing in wireless networks:** Circuit Switching, Packet Switching, X.25 Protocol, Wireless Data Services: Cellular Digital Packet Data, Advance Radio Data Information Systems (ARDIS), RAM Mobile Data, Integrated services digital network-ISDN(Broadband ISDN, ATM)

SS7 Signaling systems: Common channel signaling, Network services part-NSP (Message transfer Part, Transaction capabilities signal connection Control Part), User Part(integrated Services Digital network part-ISUP, Transaction Capabilities Application Part(TCAP), Operation maintenance and administration part(OMAP), Signal Trafficking in SS7, SS7 Services, performance of SS7

Networks Access: Protocols for Network access, network databases, Universal Mobile telecommunication system

Satellite Communications: Satellite Parameters, Capacity Allocations – Frequency and Time Division

Wireless Systems: AMPS, ETACS, Global System for Mobile-GSM (GSM services, Features, Architecture, Radio sub-system, Channel Types(Traffic Channels, Control Channels), GSM call, Frame structure, Signal processing, CDMA Digital Cellular standard -IS-95(Forward CDMA Channel: Convolution Encoder and Repetition Circuit, Block Inter-leaver, Long PN Sequence, Data Scrambler, Power control sub channel, Orthogonal Covering, Quadratuer Modulation), Reverse CDMA Channel (Convolution Encoder and symbol repetition, Block Inter-leaver, orthogonal Modulation, Variable Data Rate Transmission, Direct sequence spreading, Quadratuer Modulation) CT2 standard for Cordless Systems Telephones, Personnel Access Communication Networks(PACS System Architecture, PACS Radio Interface)

Wireless Standards: Wireless Local Loop, Broad band wireless access standards – WiMax, IEEE 802.16, **and Mobile IP and Wireless Application Protocol:** Mobile Access, Wireless Application Protocol

UNIT-V

Wireless LANS

Wireless LAN Technologies: Infrared, Spread Spectrum, Narrow Band Microwave

Wireless LAN Standards: Wi-Fi (IEEE 802.11) standards – 802 Architecture, 802.11: Architecture, Services, Medium access Control, Physical Access Layer, protected access, **Other IEEE 802.11 Standards – IEEE 802.15 (Blue Tooth) Standards:** Overview, Radio Specification, Baseband specification, Link Manager Specification, Logical Link Control and adaption Protocol, IEEE 802.15

Text Books

1. Wireless Communications and Networks, William Stallings, Pearson Education, Second Edition
2. Wireless Communications – Principles and Practice, Theodore S Rappaport, Prentice Hall of India, Second edition, 2007
3. Mobile Communications, Jochen Schiller, Pearson Education, Second Edition

K.L.University
Pre-Ph.D Examination
Wireless Communication
MODEL QUESTION PAPER

Time: 3hrs **Max Marks: 100**

Answer any **Five** of the following:

1. Discuss the need for a Protocol architecture and present the salient features of OSI model and TCP/IP Architecture
2. What is fading and discuss various types of fades and the statistical methods used for Multi-Path fading
3. Discuss various models that are used for deigning the wireless communication Links
4. Discuss various Equalization Techniques used for improving the LINK performance.
5. Briefly discuss various types of Wireless systems and the applicable standards in use as on today
6. Discuss 802.11 Architecture, services, medium access and Physical Access
7. Discuss how traffic is routed in wireless networks?
8. Discuss Multiple access based on spread spectrum and space division

DESIGN PATTERNS

SYLLABUS

UNIT –I
Introduction: Design Patterns, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT-II
A Case Study: Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

UNIT-III
Creational Patterns: Abstract Factory, Builder, Factory method, Prototype, Singleton.

UNIT-IV
Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.

UNIT-V
Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method, Visitor.

Text Book:
Design Patterns by Erich Gamma, Pearson Education

DESIGN PATTERNS

MODEL PAPER

Time: Three hours Max. marks: 100

Answer any FIVE questions.
All questions carry equal marks 5 x 20=100M

1. Explain the template of a Design Pattern.

2. (a) Explain the features of structural patterns in detail
   (b) Explain the motivation of adapter design pattern

3. Explain the structure & participants of Facade pattern with suitable examples.
   Describe the applications of Facade Pattern

4. Explain the Proxy pattern in detail.

5. (a) Mention the useful techniques for implementing the abstract factory pattern
   (b) Write the sample code for abstract factory design pattern

6. Explain the User operations for a document editor.

7. Explain the State pattern in detail.

8. Explain the Composite pattern in detail.

Computer System Architecture

SYLLABUS

Digital Logic Circuits: Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-flops, Sequential Circuits, Digital Components: Integrated Circuits. Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit, Data Representation: Data Types, Complements, Fixed-point Representation, Floating-point Representation, Other Binary Codes, Error Detection Codes

Register Transfer & Micro-operations: Register Transfer Language, Register Transfer, Bus & memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Introduction codes, Computer Registers, Computer Instructions, Timing and Control, Instruction cycle, Memory-Reference Instruct ion, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic. Microprogrammed Control: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Central Processing Unit: General registers Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms Floating-point Arithmetic operations

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector processing, Array Processors, Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms
Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor, Serial Communication.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Men Cache Memory, Virtual Memory, Memory Management hardware.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Time-shared common Bus, Multiport Memory, Crossbar Switch, Multistage Switching Network, Hypercube Interconnection, Interprocessor Arbitration , System Bus, Serial Arbitration Procedure, Parallel Arbitration Logic, Dynamic Arbitration Algorithms, InterProcessor Communication and Synchronization, InterProcessor Synchronization, Mutual Exclusion With a Semaphore

Text Book:
. Morris M. Mano, 'Computer Systems Architecture', 3rd Edition

Reference Books :
1. John P Hayes, 'Computer Architecture and Organisation' 2nd edition.
2.V.Carl Hamacher et.al, 'Computer Organization' 2nd edition.

Computer System Architecture

MODEL PAPER

Time: Three hours Max Marks: 100

Answer any FIVE questions.
All questions carry equal marks.

1. Briefly explain about the hard wired and micro programmed control.

2. (a) What are the functional units? What is bus and explain the different types of bus structures.
   (b) Explain the different types of addressing modes.

3. (a) Explain signed operand multiplication with Booth's algorithm.
   (b) Explain the concept of Integer division.

4. Explain cache memories and virtual memories

5. (a) What is pipelining? Explain the concept of data hazard and instruction hazards.
   (b) Explain the conditions of parallelism.

6. (a) Explain the cache coherence and synchronization mechanisms.
   (b) Explain the message passing mechanisms.

7. Discuss the scalable and multithreaded architectures and demand driven mechanisms.

8. (a) Describe the register organization in a general computer with a block diagram.
   (b) Explain the instruction formats and data manipulation instructions

ADVANCED SOFTWARE ENGINEERING
Syllabus

UNIT I:
A Generic view of process: Software engineering-A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models. Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process. Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

UNIT-II
Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management. System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT III:
Design Engineering: Design process and Design quality, Design concepts, the design model. Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

UNIT IV
Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation. Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

UNIT V
Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan. Managing Software Projects: The Management Spectrum, People, product, The process, W5HH principle

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach-Roger S. Pressman, 7th edition, McGrawHill International Edition.
2. Software Engineering-Sommerville, 7th edition, Pearson education.

REFERENCES:

1. Software Engineering-K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach-James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design-Shely Cashman Rosenblatt,Thomson Publications.
4. Software Engineering principles and practice-Waman S Jawadekar, The McGraw-Hill Companies.

ADVANCED SOFTWARE ENGINEERING

Model Question Paper

Time: 3 hours
Max. Marks: 100M

Answer any five Questions

1. (a) What is feasibility study? Describe the feasibility study Process. [10M]
   (b) Write a short note on feasibility report. [10M]
2. (a) What is a process pattern? Describe the template of a process pattern. [10M]
   (b). Explain about software requirements document [10M]
3. (a) Discuss in detail the water-fall model with the help of a neat diagram. [10M]
   (b)Write down the advantages and disadvantages of water-fall model. [10M]
4. (a) Explain the various phases of the unified process model with a neat diagram [10M]
   (b) How do we specify system requirements using standard form? [10M]
5. (a) Give the complete description and details of the software Requirements Specification Document for a Library Management system. [15M]
   (b) Explain Behavioral model [5M]
6. Explain how the following can be performed in UI design
   (a) Task analysis & modeling [10M]
   (b) Display content analysis [10M]
7. Write short notes on:
   (a) Regression testing [7M]
   (b) Smoke testing [6M]
   (c) System testing [7M]
8. (a) What are the steps taken to mitigate risk? [7M]
   (b) What are the factors that can be monitored? [6M]
   (c) Explain about risk management with an example [7M]

Agile and Iterative Development: A Manager's Guide

Syllabus

Unit-I

Introduction, Iterative & Evolutionary, Iterative Development, Risk-Driven and Client Driven Iterative Planning, Time boxed Iterative Development, During the Iteration, Changes from External Stakeholder, Evolutionary and Adaptive Development, Evolutionary Requirements Analysis, Early "Top Ten" High-Level Requirements and Skillful Analysis Evolutionary and Adaptive Planning, Incremental Delivery

Unit-II

Agile Development, Classification of Methods, The Agile Manifesto and Principles, Agile Project Management, Embrace Communication and Feedback, Programming As If People Mattered, Simple Practices and Project Tools, Empirical vs. Defined & Prescriptive Process, Principle-Based versus Rule-Based, Sustainable Discipline: The Human TouchTeam as a Complex Adaptive System Agile Hype?, Specific Agile Methods

Unit- III

The Facts of Change on Software Projects, Key Motivations for Iterative Development Meeting the Requirements Challenge Iteratively, Problems with the Waterfall Early Historical Project Evidence, Standards-Body Evidence, Expert and Thought Leader Evidence, A Business Case for Iterative Development, The Historical Accident of Waterfall Validity?

Unit-IV

Scrum, Method Overview, Lifecycle, Work products, Roles, and Practices, Values Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures Adoption Strategies, Fact versus Fantasy,

Unit – V

Extreme Programming, Method Overview, Lifecycle,Workproducts, Roles, and Practices Values, Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures Adoption Strategies, Fact versus Fantas, Strengths versus "Other"

Reference Book

Agile and Iterative Development: A Manager's Guide

By Craig Larman

Agile and Iterative Development: A Manager's Guide

Model Question Paper

Time: 3 hrs Max Marks: 100

Answer any five questions

1.

a. Justify that iterative development is worthwhile, or better in some qualities than the waterfall.

b. Differentiate between Risk Driven, Client Driven and Time Boxed Iterative Development.

2. Differentiate between conventional software models and Agile Methodology of software development

3. Justify that Agile Methodology Embraces 1.Communication and Feedback, 2.Programming As If People Mattered, 3.Simple Practices and 4.Project Tools

4.

a. Enumerate Research, historical, and other evidence related to Iterative Interactive Development.

b. What are the evidences of Waterfall Risk?

5. , Detail the Work Products, Roles, and Practices, Values, Common Mistakes and Misunderstandings, in the Scrum model

6. Extreme programming is the State –of –Art technology in Agile Process - Justify

7. How to handle the design of a database with an iterative process?

8. How to do documentation for maintenance, when we want to be agile?

WIRELESS COMMUNICATION NETWORKS

SYLLABUS

UNIT - I WIRELESS MEDIUM

Air Interface Design – Radio propagation mechanism – Pathloss modeling and Signal Coverage – Effect of Multipath and Doppler – Channel Measurement and Modelling – Simulation of Radio Channel.

UNIT – II WIRELESS MEDIUM ACCESS

Fixed Assignment Access for Voice Networks – Random Access for Data Networks –Integration of Voice and Data Traffic.

UNIT - III WIRELESS NETWORK OPERATION

Wireless Network Topologies – Cellular Topology – Cell fundamentals – Signal to Interference Ratio – Capacity Expansion – Mobility Management – Resources and Power Management –Security in Wireless Networks.

UNIT - IV WIRELESS WAN

GSM and TDMA Technology – Mobile Environment – Communication in the Infrastructure –CDMA Technology – IS95 – IMT2000 – Mobile Data Networks – CDPD Networks – GPRS – Mobile Application Protocol.

UNIT - V WIRELESS LANS AND HIPERLANS

Introduction to wireless LANs – IEEE 802.11 – WPAN IEEE 802.15 –Mobile AdHoc Networks(MANET)- Principle and operation - Wireless Home Networking – Concepts of Bluetooth Technology – Wireless Geolocation.

REFERENCES:

1. Kaveth Pahlavan, K.Prasanth Krishnamurthy, “Principles of Wireless Networks”, Pearson Education Asia, 2002

2. Leon Garcia, Widjaja, “Communication Networks”, Tata McGraw Hill, New Delhi, 2000.

3. William Stallings, “Wireless Communications and Networks”, Second Edition Prentice Hall, India 2007

4. Jon W Mark , Weihua Zhuang, ”Wireless communication and Networking”, Prentice Hall India 2003

Wireless Communication Networks

MODEL QUESTION PAPER

Time: 3hrs Max Marks: 100

Answer any FIVE of the following

1)Explain briefly Radio Propagation Mechanisms?

2)Explain the effects of Multipath and Doppler?

3)Explain briefly the Integration of Voice and Data Traffic?

4)Explain briefly Cellular Topology?

5)Explain Security in Wireless Networks?

6)Explain Mobile Environment and CDMA Technology?

7)a)Explain Wireless Home Networking?

b)Explain Blue Tooth Technology?

8)a)Explain GPRS Technology?

b)Explain Mobile Application Protocol?

SOFTWARE QUALITY ASSURANCE AND TESTING
SYLLABUS

UNIT I
Software Quality Assurance Framework and Standards SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance, Software Quality Assurance Plan: Steps to Develop and implement a Software Quality Assurance Plan "Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma

UNIT II
Software Quality Assurance Metrics and Measurement Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs. Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, and validate the software quality metrics Software quality indicators Fundamentals in Measurement theory

UNIT III
Software Testing Strategy and Environment: Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing
Software Testing Methodology: Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

UNIT IV
Software Testing Techniques: Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing Software Testing Tools Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

UNIT V
Testing Process Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software Installation, Test software changes, Evaluate Test Effectiveness. Testing Specialized Systems and Applications: Testing Client/Server Web Applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse

Text Books:

1. Effective Methods for Software Testing, 2nd Edition by William E. Perry , Second Edition, Wiley 2006
2. Software Quality, Mordechai BenMenachem/Garry S. Marliss, by Thomson Learning Publications, 1997

Software quality Assurance and Testing

Model paper

Answer any five questions…

Max marks: 5 X 20 =100

1. What is software quality? Discuss the software quality assurance frame work?
2. What is the difference between 3 sigma and 6 sigma? How 6 sigma can used to decide the quality of software?
3. What are software quality metrics? Explain in detail in-process quality metrics ith a suitable example?
4. What are software quality requirements? How can we measure , analyze and validate the software quality metrics results?
5. How validation and verification are different? Discuss the functional and structural testing for a web application?
6. Explain in the process involved in white box testing? What are different white box testing methods available and explain each in detail.
7. What is eleven step test process? Explain each step with respect to a web application testing?
8. What are the steps involved in testing an for application for security? Explain different types of security threats for any application of your choice?

PRINCIPLES OF SOFT COMPUTING

SYLLABUS

UNIT-1:

Intoduction to neuro-fuzzy and soft computing: computing constituents and conventions, characteristics. fuzzy set theory: basic definitions and terminology, set-theoretic operations, Mf formulation and parameteization. Fuzzy rules and reasoning: extension principles and fuzzy relations, fuzzy if-then rules, fuzzy reasoning. Fuzzy inference systems: mamdani fuzzy models, sugeno fuzzy models, Tsukamoto fuzzy models, other considerations.

UNIT-II

Regression and optimization:least-squares methods for system identification: introduction, basics of matrix manipulation and calculus, least-square estimator, geometric interpretation of LSE, recursive least squares estimator, recursive LSE for time varying systems, statistical properties and maximum likelihood estimator, LSE for nonlinear models.derivative-based optimization: introduction, descent methods, the method of steepest descent, newtons methods, step-size determination, conjugate gradient methods, analysis of quadratic case, non linear least square problems, incorporation of stochastic mechanisms. derivative-free optimization: introduction, genetic algorithms, simulated annealing, random search, downhill simple search.

UNIT-III

neural networks: Adaptive networks, supervised learning neural networks, unsupervised learning and other neural networks. neuro-fuzzy modeling: ANFIS, Coative Neuro-Fuzzy Modeling: Towards Generalized ANFIS. advanced neuro-fuzzy modeling: classification and regression trees, data clustering algorithms, rule based structure identification.

UNIT-IV

neuro fuzzy control: ANFIS: introduction, architecture, hybrid learning algorithm, learning methods that cross fertilize ANFIS and RBFN, ANFIS as a universal approximation. Simulation examples: example 1. Modeling a two-input sinc function, Example 2. Modeling a three input non-linear function, example 3. On-line identification in control systems, example 4. Predicting chaotic time series. coactive neuro-fuzzy modeling: Towards Generalized ANFIS: introduction, framework, neuron functions for adaptive networks, neuro-fuzzy spectrum, analysis of adaptive learning capability.

NEURO-FUZZY CONTROL-I

Introduction, framework, control systems and neuro-fuzzy control, expert control, inverse learning, specialized learning, back-propagation through time and real-time recurrent learning.

NEURO-FUZZY CONTROL-II

Introduction, Reinforcement learning control, Gradient-free optimization, Gain Schediling, Feedback Linearization and Sliding Control.

UNIT-V

GENETIC ALGORITHMS:

A Genetic Introduction to Genetic Algorithms: What are Genetic Algorithms, Robustness of Traditional Optimization and search methods, goals of Optimization, How genetic algorithms different from traditional methods, A Simple Genetic Algorithm, Genetic Algorithms at work

GENETIC ALORITHMS REVISITED: Mathematical Foundations Computer implementation of a genetic algorithm

ADVANCED OPERATIONS AND TECHNIQUES IN GENETIC SEARCH: Introduction to Genetics-based Machine learning, Applications of Genetics-based Machine Learning.

Text Books:

Neuro-Fuzzy And Soft Computing BY "J-S.R.Jang, Ct. Sun, E.Mizutani" Prentic-Hall Of India Private Limited Publications.

Genetic Algorithms BY "David E. Goldberg" Pearson Education.

REFERENCES:

Neural Networks And Learning Machines By "Simon Haykin"3rd Edition, Phi Publication.

Fuzzy Sets And Fuzzy Logic By " George J. Klir|Bo|Yuan" In Phi Publications.

PRINCIPLES OF SOFT COMPUTING
Model Question Paper

Time: 3hrs Answer Any Five Questions Max Marks: 100

1. a) What is Soft Computing? Compare and contrast hard computing with soft computing?

   b) What do you mean by Fuzzy Sets and Membership Functions? Explain With an Example.

2. a) Explain Extension principle on Fuzzy sets with continuous and discrete universes with examples?

   b) Explain the role of Fuzzy IF-THEN Rules and Fuzzy-Reasoning Rules in Fuzzy Inference Systems?

3. a) What do you mean by Fuzzy Inference System. Briefly explain different kinds of Fuzzy Models.

4. Explain different kinds of least square methods for System Identification.

5. a) Explain Back Propagation for Feed forward networks with example.

   b) Compare and Contrast OFF-Line learning with an ON-Line learning Rules.

6. Demonstrate the Architecture of ANFIS.

7. a) Explain the following

      i) Feed Back control systems ii) Neuro-fuzzy control systems.

   b) What do you mean by Gain Scheduling? Explain with an example?

8. a) Discuss the role of Genetic Algorithms in research development. Demonstrate how genetic algorithms different from traditional methods

b) Explain advanced operations and techniques in genetic search?

WIRELESS SENSOR NETWORKS
SYLLABUS

UNIT I

Basics of Wireless Sensors and Applications, The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

UNIT II

Data Retrieval in Sensor Networks, Classification of WSNs, MAC Layer, Routing Layer, High-Level Application Layer Support, Adapting to the Inherent Dynamic Nature of WSNs Sensor Network Platforms and Tools, Sensor Network Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms.—

UNIT IV

Operating System: TinyOS, Imperative Language: nesC, Dataflow Style Language: TinyGALS, Node-Level Simulators, ns-2 and its Sensor Network Extension, TOSSIM.-

UNIT V

Sensor Network Databases : Challenges ,Query Interfaces, High level Database Organization, In-Network Aggregation, Data-centric Storage, Temporal Data.

TEXT BOOKS:

1. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science Imprint, Morgan Kauffman Publishers, 2005, rp2009.

REFERENCES:

1. Adhoc Wireless Networks: Architectures and Protocols, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2. Wireless Sensor Networks: Principles and Practice, Fei Hu, Xiaojun Cao, An Auerbach Book, CRC Press, Taylor & Francis Group, 2010
3. Wireless Ad hoc Mobile Wireless Networks: Principles, Protocols and Applications, Subir Kumar Sarkar et al., Auerbach Publications, Taylor & Francis Group, 2008.
4. Wireless Sensor Networks: Signal Processing and Communications Perspectives, Ananthram Swami et al., Wiley India, 2007, rp2009.

KL UNIVERSITY

Pre-Ph.D EXAMINATION

WIRELESS SENSOR NETWORKS

MODEL QUESTION PAPER

Time : 3hrs **Max Marks : 100**

ANSWER ANY FIVE QUESTIONS **(5x20=100M)**

1 .a) Explain the required mechanisms for WSN.

b) Explain the applications and design issues of WSN's.

2. a) Explain the data retrieval concepts in sensor networks.

b) Explain about inherent dynamic nature of WSN's.

3. a) Briefly explain about sensor network hardware.

b) Write about sensor network programming challenges.

4. a) Explain about clustering of sensors.

b) Explain about MAC layer.

5.a) Explain the terms

i) TinyOS ii) NesC iii) TOSSIM.

6. a) Discuss Datacentric Storage in WSN.

7. a) Explain Clustering of sensors.

b) Explain about In-network aggregration in WSN.

8. a) Explain about Energy consumption in WSN.

b) Explain the applications of WSN.

PARALLEL COMPUTING

SYLLABUS

PARALLEL COMPUTER MODELS: Parallel Hardware and Parallel Software, Modifications to the Von Neumann Model, Parallel Hardware, Parallel Software, Input and Output, Performance, Parallel Program Design, Writing and Running Parallel Programs, Distibuted-Memory Program with The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Supercomputers, PRAM and VLSI Models

PROGRAM AND NETWORK PROPERTIES: Conditions of Parallelism, Program Partitioning,Program Flow Mechanisms, System Interconnect Architectures. Performance Metrics and Measures, Parallel Processing Applications, Speedup performance Laws

MULTIPROCESSORS AND MULTICOMPUTERS: Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message -Passing Mechanisms, Latency - Hiding Techniques, Principles of Multithreading, Scalable and Multithreaded Architectures, Dataflow Computers.

SHARED-MEMORY PROGRAMMING WITH Pthreads: Process, Threads and Pthreads; Hello, World; Matrix-Vector Multiplication, Critical Sections, Busy-Waiting, Mutexes, Producer-Consumer Synchronization and Semaphores, Barriers and Condition Variables, Read-Write Locks, Caches, Cache Coherence and False Sharing, Thread-Safety

SHARED-MEMORY PROGRAMMING WITH OpenMP: Getting Started, The Trapezoidal Rule, Scope of Variables, The Reduction Clause, The Parallel for Directive, More about Loops in OpenMP: Sorting, Scheduling Loops, Producers and Consumers, Caches, Cache Coherence and False Sharing, Thread-Safety
Introduction to CUDA: Introduction, Data Parallelism, CUDA Program Structure, Matrix-Matrix Multiplication example, Device memories and Transfer, kernel functions and Threading.

Text Books:

1. Peter S. Pacheco, ” Introduction to Parallel Programming”; Morgan Kaufmann
2. Kai Hwang, “Advanced Computer Architecture”; TMH
3. D.A.Patterson and J.L.Hennessey, “Computer Architecture a quantitative approach”, Morgan Kaufmanns, 3rd Edition(An imprint of Elsevier)
4. David B.Kirk”Programming massively parallel processors A Hands-on Approach”

Reference Books:

1. Kai Hwang and A.Briggs,”computer architecture and parallel processing” International edition McGraw-Hill.

Parallel Computing

MODEL PAPER

Time: Three hours Max Marks: 100
Answer any FIVE questions.
All questions carry equal marks.

1. (a) Differentiate between sequential computer and parallel computer
   (b) Explain about writing and running parallel programs

2. (a) Describe about Multi vector and SIMD Supercomputers
   (b) Determine how to design the parallel program effectively.

3. (a) What are Performance Metrics and Measures and how they can be implemented.
   (b) Explain Parallel Processing Applications and mention their importance

4. (a) Explain about message passing mechanisms with an example.
   (b) Explain the principles of multithreading and what is hyperthreading.

5. (a) Define a process. Explain about each state of the process
   (b) Explain about threads and pthreads.

6. (a) Explain producers and consumers problem in shared memory programming with openMP.
   (b) Explain about thread-safety in shared memory programming with openMP.

7. (a) Explain about cache coherence and false sharing in shared memory programming with openMP.
   (b) Explain the amdahl's law for measuring speed up performance with the help of an example.

8. (a) Illustrate the overview of CUDA Device Memory Model.
   (b) Describe CUDA API functions for device global memory management.

Agile and Iterative Development: A Manager's Guide

Syllabus

Unit-I

Introduction, Iterative & Evolutionary, Iterative Development, Risk-Driven and Client Driven Iterative Planning, Time boxed Iterative Development, During the Iteration, Changes from External Stakeholder, Evolutionary and Adaptive Development, Evolutionary Requirements Analysis, Early "Top Ten" High-Level Requirements and Skillful Analysis Evolutionary and Adaptive Planning, Incremental Delivery

Unit-II

Agile Development, Classification of Methods, The Agile Manifesto and Principles, Agile Project Management, Embrace Communication and Feedback, Programming As If People Mattered, Simple Practices and Project Tools, Empirical vs. Defined & Prescriptive Process, Principle-Based versus Rule-Based, Sustainable Discipline: The Human Touch

Team as a Complex Adaptive System Agile Hype?, Specific Agile Methods

Unit- III

The Facts of Change on Software Projects, Key Motivations for Iterative Development Meeting the Requirements Challenge Iteratively, Problems with the Waterfall Early Historical Project Evidence, Standards-Body Evidence, Expert and Thought Leader Evidence, A Business Case for Iterative Development, The Historical Accident of Waterfall Validity?

Unit-IV

Scrum, Method Overview, Lifecycle, Work products, Roles, and Practices, Values Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures Adoption Strategies, Fact versus Fantasy,

Unit – V

Extreme Programming, Method Overview, Lifecycle,Workproducts, Roles, and Practices Values, Common Mistakes and Misunderstandings, Sample Projects, Process Mixtures Adoption Strategies, Fact versus Fantas, Strengths versus "Other"

Reference Book

Agile and Iterative Development: A Manager's Guide

By Craig Larman

Agile and Iterative Development: A Manager's Guide

Model Question Paper

Time: 3 hrs Max Marks: 100

Answer any five questions

1.

a. Justify that iterative development is worthwhile, or better in some qualities than the waterfall.

b. Differentiate between Risk Driven, Client Driven and Time Boxed Iterative Development.

2. Differentiate between conventional software models and Agile Methodology of software development

3. Justify that Agile Methodology Embraces 1.Communication and Feedback, 2.Programming As If People Mattered, 3.Simple Practices and 4.Project Tools

4.

a. Enumerate Research, historical, and other evidence related to Iterative Interactive Development.

b. What are the evidences of Waterfall Risk?

5. , Detail the Work Products, Roles, and Practices, Values, Common Mistakes and Misunderstandings, in the Scrum model

6. Extreme programming is the State –of –Art technology in Agile Process - Justify

7. How to handle the design of a database with an iterative process?

8. How to do documentation for maintenance, when we want to be agile?

THERMAL IMAGING CAMERAS CHARACTERISTICS AND PERFORMANCE

SYLLABUS

UNIT I: An Introduction to Thermal Imaging: The electromagnetic spectrum, Definition of Thermal Imaging,Temperature measuring devices: contact, non-contact devices. Atmospheric Transmission, Choice of 3-5um or 8-12um,,Important Factors in the Applicationof Thermal Imaging, Specifying and Measuring thePerformance of a Thermal Imager.

UNIT II: Thermal imaging Cameras and their component parts:A basic Thermal Imager,Image-Forming Optical System,Windows for Thermal Imaging,Scanning Mechanisms.Types of Thermal Imaging Cameras: Cooled thermal Imaging Camera, Uncooled Thermal Imaging Camera.Radiation Detectors:The Basic Detector,Photon/Quantum Detectors,Thermal Detector Arrays,Cooling Detectors.Working of Thermal imaging camera, Image Enhancement in Thermal Imaging Camera: Gain correction, Offset Correction, Histogram equalization.

UNIT III:Performance Parametersfor Components ofa Thermal Image: Introduction, Lenses: Focal Length, Magnification (M),Numerical Aperture (NA), *f*/number, transmission. Detectors:RMS Noise, noise Spectrum, Noise Equivalent Power (NEP), D* (D-star), Responsivity, Spectral Response, Frequency Response, time Constant.Scanners:horizontal scan linearity, Vertical scan linearity, Scan Judder.Displays: General, Maximum Luminance, polar Luminance Distribution, Grey scale/ Linearity, Distortion.

UNIT IV:Performance Parametersfor a CompleteThermal Imager: Introduction, Factors Affecting Performance,PerformanceParameters: MTF,Nyquist limit, Aliasing, Signal Transfer Function, Noise-equivalent temperature difference (NETD), Minimum resolvable temperature difference (MRTD), Minimum detectable temperature difference (MDTD), Field of View (FOV), Close focus distance, spectral response, frame rates and readout timing, other factors.

UNIT V: Applications of Thermal Imaging Cameras: Introduction. Industrial Applications:Buildings and Structures, Inspection of Composite Panelsand Structures, Inspection of Furnace and Other High-Temperature Constructions, Plant and Site Inspection.Advanced and Specialist Applications:Detection of Buried Objects,studying and Preserving Works of Art,Fire Detection and Volcano Monitoring,Visualizing Electric and Magnetic Fields. Medical and Biological Applications, Military and civil surveillance and other Applications.

Reference Books:

1. Thermal Imaging Cameras Characteristics and performance by Thomas L. Williams. .

2. Common sense approach to Thermal Imaging by Gerald C. Holst.

Thermal imaging cameras characteristics and performance

Model Question

Time: 3 hrs Answer any five questions: Max Marks: 100

1.a) what is Thermal Imaging? What are the factors that affect the choice of 3-5um or 8- 12um wave-length bands? 10M

b)Explain different types of temperature measuring devices. 10M

2 a) What are different types of Thermal Imaging Cameras? Explain any two cooling detectors.10M

b) Explain different scanning mechanisms in Thermal Imaging Cameras. 10M

3 a) Explain the working of Thermal Imaging Camera with neat block diagram. 10M

b) How an Image is enhanced with the Gain correction and Offset correction? 10M

4. a) What are the performance parameters of Lenses in Thermal Imaging Camera? Explain them 10M

b) Explain how RMS noise, D* (D-star) and Noise-equivalent power (NEP) effects the performance of detectors? 10M

5 a) What are the performance parameters of scanners in thermal Imaging Camera? Explain them. 10M

b) Write short notes on different parameters of displays that effects the performance of Thermal Imaging Camera. 10M

6.a) Explain briefly about the effect of Aliasing and Signal transfer function in Thermal Imaging Camera. 10M

b) What is Noise-Equivalent Temperature Difference (NETD)? Explain briefly about Field of View (FOV) in Thermal Imaging Camera? 10M

7. a) Explain how Thermal Imaging Camera finds application in Buildings and Structures?10 M

b) List out some advanced and specialized applications of Thermal Imaging and discuss them in brief? 10M

8.a) Explain briefly about the applications of Thermal Imaging in Medical and Biological fields 10M

b) How Thermal Imaging is used in Military and Civil Surveillance applications. (10M)

Thermal Image Processing

Syllabus

UNIT I: Digital Image Fundamentals: Fundamental steps in Digital Image Processing, Components of an Image Processing System. Image sensing and Acquisition: Image Acquisition using a single sensor, Image Acquisition using sensor strips, Image Acquisition using sensor arrays, A simple Image Formation Model. Image Sampling and Quantization: Basic components in sampling and quantisation, Representing Digital images, Spatial and Gray-level Resolution, Zooming and Shrinking Digital Images..

UNIT II: Image Enhancement: Background. Some Basic Gray level Transformation: Image Negatives, Log Transformations, Power-law Transformations, Piecewise- Linear Transformation Functions, Histogram Equalization. Enhancement using Arithmetic/Logic Operations: Image subtraction, Image Averaging.

UNIT III: Image Restoration: A Model of the Image Degradation/Restoration process, Noise Models: Spatial and Frequency properties of Noise, Some Important Noise Probability Density Functions, Periodic Noise, Estimation of Noise Parameters. Restoration in the presence of Noise Only-Spatial Filtering: Mean Filters, Order-Statistics Filters, Adaptive Filters. Periodic Noise Reduction by Frequency Domain Filtering: Bandreject Filters, Bandpass Filters, Notch Filters, optimum Notch Filters.

UNIT IV: Image registration: Fundamental Issues in Face Recognition. Face Recognition in the Visible Spectrum: Holistic Approaches, Feature-based Approaches.Face Recognition in the Thermal IR Spectrum,Image Registration Algorithm: Advantages of Edge-based Mutual Information Image Registration, ImageFace Detection, and Image Rectification.

UNIT V: Fusion of Visual and Thermal images: Image Fusion, Enhancing Poor Visibility Images, Genetic Algorithm and Image Fusion, Continuous Genetic Algorithm(CGA), CGA components, Fusion of Visual and Infrared thermal Images.

Text Books:

1. Digital Image Processing, GONZALEX, WOODS, Addison Wesley.
2. Fundamentals of Digital image processing, A.K.JAIN, PHI.
3.Bio-Inspired Computational Algorithms and Their Applications, by ShangceGao.

Thermal Image Processing

Model Question

Time: 3 hrs Max Marks: 100

Answer any five questions:

1. Explain about fundamental steps in Image Processing with neat diagram? 20M

2. What is Image sampling and quantization? How do you represent a digital image? 20M

3. Mention some basic Gray level transformations. Explain them in detail. 20M

4. a) Explain Histogram Equalization technique in Image Enhancement? 10M

b) Write short notes on Image Subtraction and Image Averaging techniques in image Enhancement 10M

5. a)Enumerate the difference between image enhancement and Image Restoration. Explain briefly about the Image Degradation model. 10M

b) Write short notes on Gaussian Noise and Rayleigh Noise. 10M

6. a)Explain different Order-Statistics filters in spatial domain. 10M

b)Discuss the concept of Bandreject filters and Bandpass filters in frequency domain. 10M

7. a)What are the fundamental issues in Face recognition? 10M

b) Explain about Edge-based Mutual Information Image Registration algorithm. 10M

8. What is genetic algorithm? Explain the components of Continuous Genetic algorithm with the help of neat flow chart. 20M

Basics of Micro Electro Mechanical Systems

Syllabus

Overview of MEMS and Micro Systems: Introduction, miniaturization, Reliability, Advantages of MEMS, working principles of chemical sensors, optical, pressure and thermal sensors, micro actuation: actuation using thermal forces, actuation using piezo electric crystals, actuation using electrostatic forces; micro accelerometers, micro fluidics, MEMS switches, phase shifters, varactors, tunable oscillators

Basics of MEMS technology: Molecular theory of matter and intermolecular forces, doping of semi conductors, the diffusion process, scaling laws in miniaturization, Engineering mechanics: static bending of thin plates, mechanical vibrations, thermo mechanics, fluid flow in nano scale.
Micro system Design: Introduction, design considerations, process design, mechanical design, micro system packaging, essential packaging technologies, 3D packaging, assembly, selection of materials, Finite Element Analysis (FEA).

Fabrication methods: Lithography:Introduction,wafers, masks, spinning resist and soft baking, exposure and post exposure treatment, resolution, mathematical expression of resist profiles,image reversal, interface effects, radiation and resist profiles, ion implantation, diffusion, oxidation, RIE , Chemical Vapour Deposition (CVD), Physical Vapour Deposition (PVD), deposition by epitaxy, comparison of bulk and surface micromachining, comparison of wet and dry etching, LIGA process. system level packaging, single and multichip packaging.

Case Study: MEMS capacitive switch, MEMS capacitive accelerometer, MEMS pressure sensor, quartz rate gyroscope, cantilever based micro cantilevers for mass measurement.

References:
Microsystem Design by *Stephen D.Senturia*, Springer International Edition,2010
RF MEMS Theory, Design and Technology by *Gabriel M.Rebeiz,* Wiley India Pvt Ltd.
MEMS and Microsystems: Design and Manufacture by *Tai-Ran Hsu*, Tata McGraw Hill,2002
The MEMS Handbook, *Mohamed Gad-el-Hak*, CRC Press, 2002.
Foundations of MEMS by *Chang Liu*, Second Edition, Pearson Publication

Basics of Micro Electro Mechanical Systems
Model Question Paper

ANSWER ANY FIVE QUESTIONS

1) a) Explain clearly the advantages of MEMS devices 10M
   b) Discuss various applications of MEMS 10M

2) a) Explain doping and diffusion process in semiconductors 10M
   b) Discuss the fluid flow in micro channels 10M

3) a) Discuss the static bending theory applied to Microsystems 10M
   b) Explain about factors influence the packaging of MEMS devices 10M

4) a) Explain various diffusion techniques used in MEMS industry 10M
   b) Differentiate between bulk micromachining and surface micromachining 10M

5) a) Explain about Physical Vapor Deposition technique with suitable application 10M
   b) Explain about Chemical Vapor Deposition technique with suitable application 10M

6) a) Compare bulk and surface micromachining with examples 10M
   b)Compare wet and dry etching with suitable example 10M

7) a) Explain the design considerations of MEMS accelerometer 7M
   b) With details explain about the mass measurement using MEMS cantilevers 7M

   c) A mechanical resonator (fixed-fixed, or double clamped) has been demonstrated using SiC thin film material. The length (L), width (W) and thickness (T) of the resonator are 1.1microns, 120 nanometers, 75nanometers respectively. Knowing the resonant frequency found experimentally was 1.014 GHz and assuming a Young's modulus of 700 GPa, find the density of the SiC material used for the resonator. 6M

8) Explain in short about
   a) MEMS tunable oscillator 7M
   b) actuation using electrostatic forces 7M
   c)Scaling laws in miniaturization 6M

MEMS Measurement Techniques

Syllabus

Introduction: Macro-Meso, Micro and Nanostructure of Materials, Fundamentals of crystallography and Crystal structures Optical Microscopy: Geometry of Optics, Resolution, and Construction of a Microscope, Image Contrast, and Phase Contrast. Electron Microscopy: SEM: Electron Optics - Interaction of Electrons and Matter - Elastic and Inelastic Scattering, Backscattered Electrons, Secondary Electrons,

Materials For MEMS - Substrate and wafer, silicon as a substrate material, silicon compound, silicon Piezo-resistors, Gallium Arsenide, quartz, Piezoelectric crystals, polymers:Polymide,SU-8,Liquid Crystal Polymers, PDMS, PMMA, mechanical properties of polymers and packaging Materials

Microscopy – Image Formation, magnification, and depth of field, distortion, detectors, Contrast, and Resolution. TEM: Electron diffraction, different electron Diffraction techniques, Atomic Force Microscopy(AFM): Construction and principle, Surface & optical profilometry, Semiconductor Material Impurity Characterization: Spectroscopic Ellipsometry (SE), X-ray Reflectivity (XRR), X-ray Fluorescence (XRF), X-ray Diffraction (XRD), Secondary Ion Mass Spectrometry (SIMS), Auger Electron Spectrometry (AES), Rutherford Backscattering Spectrometry, FTIR.

Electrical Characterization- Four-probe technique, Hall Effect, sheet resistance C-V measurements, Carrier lifetime, impurity profiling, I-V measurements

Case Study- Optical characterization of MEMS cantilever, piezo electric, capacitive, Magnetomotive, piezo resistive, dielectric gradient, Electro thermal actuation schemes for cantilever sensors.

Reference Books:

1. Fundamentals of Micro Fabrication by *Marc Madou*

Microsystem Design by *Stephen D.Senturia*, Springer International Edition,2010
RF MEMS Theory, Design and Technology by *Gabriel M.Rebeiz*, Wiley India Pvt Ltd.
MEMS and Microsystems: Design and Manufacture by *Tai-Ran Hsu*, Tata McGraw Hill,2002
The MEMS Handbook, *Mohamed Gad-el-Hak*, CRC Press, 2002.
Foundations of MEMS by *Chang Liu*, Pearson Publications

K L University
Pre-Ph.D Examination
MEMS Measurement Techniques

Model Question Paper

1. a) Estimate the number of atoms per cubic millimeter and cubic micrometer of pure silicon 10M

   b) Determine the angle between the orientation <100> to the <111> plane in a single silicon crystal cell 10M

2. a) Explain the construction and working of electron microscope 10M

   b) Explain clearly the concept of back scattering of electrons with suitable diagram 10M

3. a) Explain different electron diffraction techniques used in MEMS applications 10M

   b) List out the mechanical properties of polymer material 10M

4. a) Why Silicon is used as a substrate in MEMS 10M

   c) Explain about Atomic Force Microscopy with neat diagram 10M

5. a) Explain about X-ray Difraction Spectroscopy and its uses. 10M

   b) Explain about Fourier Transform Infrared Spectroscopy and its applications 10M

6. What is the importance of four point technique in electrical measurements 20M

7. a) Explain the dielectric gradient actuation scheme 10M

   b) Optical actuation scheme 10M

8. a) Briefly explain the characteristics of SU-8 10M

   b) With clear diagram explain the process of preparation of a wafer used for MEMS 10M

Digital Signal Processing

Syllabus

UNIT – I

DFT: Discrete Fourier series, Properties of DFS, Discrete Fourier Transform, Properties of DFT: periodicity, linearity, circular shift of sequence, time reversal of a sequence, circular frequency shift, complex conjugate property, circular convolution, circular correlation, multiplication two sequences, parseval's theorem.

UNIT – II

FFT : Linear convolution using DFT, comparison of circular convolution and linear convolution, linear convolution from circular convolution, FFT introduction, Decimation in time FFT, Decimation in frequency FFT, computation of inverse DFT, differences and similarities between DIT and DIF algorithm.

UNIT – III

IIR FILTER: Introduction, properties of IIR filters, Design of Digital Butterworth and chebyshev filters using bilinear transformation, Impulse invariance transformation methods, Design of digital filters using frequency transform method.

UNIT – IV

FIR FILTERS: Introduction, characteristics of linear phase FIR filters, frequency response, Designing FIR filters using Windowing methods, comparison of IIR & FIR filters.

UNIT – V

REALIZATION OF DIGITAL FILTERS: Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

MULTIRATE DIGITAL SIGNAL PROCESSING:

Decimation, Interpolation, sampling rate conversion, implementation of sampling rate conversion

TEXTBOOKS

1.John G Proakis, Dimtris G Manolakis, "Digital Signal Processing: Principles, Algonithms and Applications", Pearson Education, 2000.
2. Ludeman" Fundamentals of Digital Signal Processing", Wiley India Pvt. Ltd

REFERENCE BOOKS

1.Alan V Oppenherim, Ronald W Schafer, John R Back, Discrete Time Signal Processing, Pearson Education, 2nd Edition 2000.
2.Emmanuel C Ifechor, Digital Signal Processing, Pearson Education, 2nd Edition.
3.Ramesh Babu, Digital signal Processing, Scitech publication, 3rd edition, 2008
4.Andreas Antonious, " Digital Signal Processing , Signals, systems and filters " Mc-Graw Hill, 2006

Digital Signal Processing

Model Question Paper

Time: 3 hrs 5X20=100M

ANSWER ANY FIVES QUESTIONS

1. a)Determine whether each of the following systems defined below is (i) causal (ii)linear (iii) Dynamic (iv) time invariant (v) stable

$y[n] = \log_{10}\{|x[n]|\}$ $y[n] = x[-n-2]$

b) Determine the response of the system with impulse response *h*[*n*] *a u*[*n*] *n* = to the input signal

$x[n] = u[n] - u[n-10].$

2. a) Compute the DFT of the square wave sequence

$$x[n] = \begin{cases} 1 & 0 \le n \le \left(\frac{N}{2} - 1\right) \\ -1 & \frac{N}{2} \le n \le (N-1) \end{cases}$$

where N is even.

b) Compute the DFT of $x[n] = \{-1, 0, -1\}$ with T=0.5. Plot the DFT sequence suggest a method for improving frequency resolution.

3. Draw the signal flow graph for 16-point DFT using DIT-FFT and DIF-FFT algorithms.

4. a) Determine the impulse response of the system described by the difference equation

$y[n] - 3y[n-1] - 4y[n-2] = x[n] + 2x[n-1]$

b) Obtain the direct form-II realization for the system described by

$$y[n] = \frac{3}{4}y[n-1] - \frac{1}{8}y[n-2] + x[n] + \frac{1}{2}x[n-1]$$

5. a) Convert the following analog filter with transfer function into a $H(S) = \frac{s+1}{(s+1)^2 + 9}$ digital IIR filter by using bilinear transformation method. The digital IIR filter is having a resonant frequency of $W_r = \frac{\pi}{2}.$

b) Explain method of constructing Butterworth circle in the Z-plane using bilinear transformation method.

6. Design an ideal low pass filter with a frequency response :

$$H_d(e^{jw}) = \begin{cases} 1 & for -\frac{\pi}{2} \le w \le \frac{\pi}{2} \\ 0 & for \frac{\pi}{2} \le |w| \le \pi \end{cases}$$

Find the values of h[n] for N=11. Find *H(z)* and also plot the magnitude response.

7. a) Describe the decimation process with a factor of '*M*'. Obtain necessary expression.
b) Obtain the necessary expression for Interpolation process.

8. (a) Discuss the realization of FIR filter structures.
(b) Realize FIR filter with system function in cascade form H (z) = 1 + (5/2) z-1+2z-2+2z-3.

Digital Image Processing
Syllabus

Unit-I:Digital Image Fundamentals:

Introduction, An image model, sampling & quantization, basic relationship between pixels, imaging geometry.

Unit-II:Image Transforms:

Properties of 2-D Fourier transform ,FFT algorithm and other separable image transforms .Walsh transforms, Handamard, Cosine, Haar, Slant transforms ,KL transforms and their properties.

Unit-III:Image enhancement:

Background, enhancement by point processing ,histogram processing ,spital filtering and enhancement in frequency domain ,color image processing.

Unit-IV:Image filtering and Restoration:

Degradation model, diagnolisation of circulant and block circulate matrices ,Algebraic approach to restoration, inverse filtering ,least mean squares and interactive restoration geometric transformations.

Unit-V:Image Reconstruction:

Image reconstruction from projectors, Radon Transforms: convolution/Filter back –project algorithm.

Text Books:
1. Digital Image Processing, GONZALEX, WOODS, Addison Wesley
2. Fundamentals of Digital image processing ,A.K.JAIN,,PHI
REFERENCE BOOKS:
1. Fundamentals of Digital Image Processing ,Anna durai, shanmuga lakshmi,Pearson

Digital Image Processing
Model Question Paper

Time: 3 hrs 5X20=100M

ANSWER ANY FIVES QUESTIONS

1. Explain about fundamental steps in Image Processing with neat diagram? 20M

2. (a) Explain how Fourier transforms are useful in digital image processing? 5M

(b) Explain the properties of Fourier transform. 15M

3. Briefly explain about image enhancement using point processing techniques. 20M

4. Differentiate between spatial domain and frequency domain enhancement techniques. 20M

5. Explain about the CMY and CMYK color models in detail. 20M

6. (a) Enumerate the differences between image enhancement and image restorations. 10M

(b) Explain the effect of diagonalization in the degradation model. 10M

7. Draw the general compression system Model? Explain. 20M

8. Discuss about the following.

(a) Minimum distance classifier. 10M

(b) Matching by correlation. 5M

(c) Back propagation. 5M

Digital Signal Processing
Syllabus

UNIT –I
DFT: Discrete Fourier series, Properties of DFS, Discrete Fourier Transform, Properties of DFT: periodicity, linearity, circular shift of sequence, time reversal of a sequence, circular frequency shift, complex conjugate property, circular convolution, circular correlation,multiplication two sequences, parseval's theorem.

UNIT –II
FFT : Linear convolution using DFT, comparison of circular convolution and linear convolution, linear convolution from circular convolution, FFT introduction, Decimation in time FFT, Decimation in frequency FFT, computation of inverse DFT, differences and similarities between DIT and DIF algorithm.

UNIT–III
IIR FILTER: Introduction, properties of IIR filters, Design of Digital Butterworth and chebyshev filters using bilinear transformation, Impulse invariance transformation methods, Design of digital filters using frequency transform method.

UNIT–IV
FIR FILTERS: Introduction, characteristics of linear phase FIR filters, frequency response,Designing FIR filters using Windowing methods, comparison of IIR & FIR filters.

UNIT –V
REALIZATION OF DIGITAL FILTERS: Solution of Difference Equations of Digital Filters,System Function, Stability Criterion, Frequency Response of Stable Systems, Realization ofDigital Filters –Direct, Canonic, Cascade and Parallel Forms.

MULTIRATE DIGITAL SIGNAL PROCESSING:
Decimation, Interpolation, sampling rate conversion, implementation of sampling rate conversion

TEXTBOOKS
1.John G Proakis, Dimtris G Manolakis, "Digital Signal Processing: Principles, Algonithms and Applications", Pearson Education, 2000.
2. Ludeman" Fundamentals of Digital Signal Processing", Wiley India Pvt. Ltd

REFERENCE BOOKS
1.Alan V Oppenherim, Ronald W Schafer, John R Back, Discrete Time Signal Processing, Pearson Education, 2nd Edition 2000.
2.Emmanuel C Ifechor, Digital Signal Processing, Pearson Education, 2nd Edition.
3.Ramesh Babu, Digital signal Processing, Scitech publication, 3rd edition, 2008
4.Andreas Antonious, " Digital Signal Processing , Signals, systems and filters " Mc-Graw Hill, 2006

K L University
Pre-Ph.D Examination
Paper – II
Digital Signal Processing

Model Question Paper

ANSWER ANY FIVES QUESTIONS

1.a) Give the Basic Block diagram of Digital Signal Processor and mention its applications and also provide the advantages and limitations over analog signal processor. [10marks]

b) What is an LTI system? Determine whether the system described by the following equations are Linear and Time invariant or not.

i) y(n) = x(n2) ii) y(n) = x2(n) [10marks]

2.a) Derive the necessary and sufficient conditions for the given system to be stable and Casual. [10marks]

b) Determine the range of values of a and b for which the linear time-invariant system with impulse response h(n) = an, n≥0 bn, n<0 is stable or not. [10marks]

3.a) Define DFT and IDFT. List Circular convolution, Circular correlation and Time reversal properties of DFT. [10marks]

b) Find the IDFT of the sequence X (K) = {2, 2-3j, 4, 2+3j} [8+8] [10marks]

4.a) What is FFT and List its applications? [10marks]

b) Given X(K)={255, 48.63+j166.05, -51+j102, -78.63+j46.05, -85, -78.63-j46.05, -51- j102, 48.63-j166.05} find x(n) using IFFT-DIF algorithm. [10marks]

5.a) What are the various building blocks required in realization of digital systems? [10marks]

b) Discuss Direct form I and Direct form – II realization structures and implement them for the transfer function given by H(Z) = (0.28Z2+0.319Z+0.04) / (0.5Z3+0.3Z2+0.17Z-0.2). [8+8]

[10marks]

6.a) Define System function and bring out its relationship with difference equation. [10marks]

b) Determine the impulse response for the system given by the following difference equation y(n)+3y(n-1)+2y(n-2) = 2x(n)-x(n- 1) [10marks]

7.a) Compare Butterworth and Chebyshev approximation techniques of filter designing. [10marks]

b) Design a Digital Butterworth LPF using Bilinear transformation technique for the following specifications:

$0.707 \leq |H(w)| \leq 1$; $0 \leq w \leq 0.2\pi$

$|H(w)| \leq 0.08$; $0.4\pi \leq w \leq \pi$ [8+8] [10marks]

8.a) Derive the conditions to achieve Linear Phase characteristics of FIR filters. [10marks]

b) Design an FIR Digital Low pass filter using Hanning window whose cut off freq is 2 rad/s and length of window N=9. [10marks]

Speech Processing

Syllabus

UNIT – I

FUNDAMENTALS OF DIGITAL SPEECH PROCESSING: Anatomy & Physiology of Speech Organs, The process of Speech Production, The Acoustic Theory of Speech Production, Digital models for speech signals.

UNIT – II

TIME DOMAIN MODELS FOR SPEECH PROCESSING: Introduction, Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech vs. silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT – III

SPEECH PROCESSING & SPEECH ENHANCEMENT: Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, Mel frequency cepstrum computation.Nature of interfering sounds, Speech enhancement techniques: spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter.

UNIT – IV

AUTOMATIC SPEECH RECOGNITION: Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System. Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMs, Adapting to variability in speech (DTW), Language models.

UNIT – V

SPEAKER RECOGNITION: Issues in speaker recognition and speech synthesis of different speakers. Text to speech conversion, , Calculating acoustic parameters, synthesized speech output performance and characteristics of text to speech, Voice processing hardware and software architectures.

TEXT BOOKS:

1. Digital processing of speech signals - L.R Rabiner and S.W. Schafer. Pearson Education.
2. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd ed., IEEE Press.
3. Fundamentals of Speech Recognition. L.R Rabinar and B.H. Juang.

REFERENCES:

1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri 1st ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1 ed., Wiley.
3. Speech Recognition - Claudio Becchetti and Lucio Prina Ricotti, Wiley

Speech Processing

Model Question Paper

ANSWER ANY FIVES QUESTIONS

1 (a). Describe the anatomy and physiology of speech production. [10marks]

(b). Explain the spectrographic analysis of speech. How are speech sounds categorised ? [10marks]

2 (a). Compare scalar quantization and vector quantization. [10marks]

(b). Discuss various speaker recognition algorithms. [10marks]

3 (a) .Explain how the Short-Time Fourier Transform (STFT) can be used as an effectivetool in speech signal processing. [10marks]

(b). What are formants explain them . [10marks]

4) (a) What do you mean by pitch detection. Explain the pitch synchronous

spectrum analysis. [10marks]

(b) Give the detail of various methods of speech recognition. [10marks]

5(a) Whatare the various practical considerations for the design of digital

filter banks for speech processing? [10marks]

. (b) Explan:l the working of isolated digit recognition system. [10marks]

6. (a) Exaplain HMM models in speech processing [10marks]

(b) Exaplain MFCC model of speaker recognition [10marks]

7.(a) explain Vector Quantization in speech p;rocessin [10marks]

(b) Expalin DTW in speech proessing [10marks]

8(a) Expalin the techniques involved in Speech Enhancement [10marks]

(b) Explain the different Pitch analysis methods [10marks]

Digital Systems Testing and Testability
Syllabus

UNIT – I

Fault Modeling: Test Economics & Product Quality. Fault Modeling: Defects, Errors and Faults. Functional Versus Structural Testing, Levels of Fault Models, A Glossary of Fault Models, Single Stuck at Faults. Fault Equivalence, Equivalence of Single Stuck at Faults, Fault Collapsing, Fault Dominance and Check Point Theorem.

UNIT – II

Logic and Fault Simulation: Simulation for Design Verification, Simulation for Test Evaluation, Modeling Circuits for Simulation: Modeling Levels and Types of Simulators, Hierarchical Connectivity Description, Gate Level Modeling of MOS Networks, Modeling Signal Gates. Algorithms for True-Value Simulation: Compiled-Code Simulation, Event Driven Simulation, Algorithms for Fault Simulation.

UNIT – III

Design For Testability: SCOP Controllability and Observability, Digital DFT and Scan Design, Ad-Hoc DFT, Methods Scan Design, Scan Design Rules, Tests for Scan Circuits ,Multiple Scan Registers, Overheads of Scan Design, Design Automation ,Physical Design and Timing Verification of Scan ,Partial-Scan Design, Variations of Scan.

UNIT – IV

Combinational Circuit Test Generation: Algorithms and Representations, Redundancy Identification, Testing as a Global Problem, Definitions, Significant Combinational Circuit ATPG Algorithms, D-Algorithm, PODEM, FAN ATPG algorithms, Test Generation Systems & Test Compaction.

UNIT – V

Built in Self Test:

The Economic Case for BIST, Chip/Board Area Cost vs. Tester Cost, Chip/Board Area Cost vs. System , Downtime Cost ,Random Logic BIST, Definitions ,BIST Process ,BIST Pattern Generation ,BIST Response Compaction Built-in Logic Block Observers ,Test-Per-Clock BIST Systems Test-Per-Scan BIST Systems, Circular Self-Test Path System , Circuit Initialization Device Level BIST ,Test Point Insertion.

TEXT BOOKS:

1.M.L. Bushnell and V.D. Agrawal, "Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits", Kluwer Academic Publishers, 2002.

REFERENCE BOOKS:

1.M. Abramovici, M.A. Breuer and A.D. Friedman, "Digital Systems and Testable Design" Jaico Publishing House, 2002.
2. P.K. Lala, "Digital Circuit Testing and Testability", Academic Press, 2002

Digital Systems Testing and Testability
Model Question Paper

[Answer any five of the Following Questions]

1. Explain in short about? 10M

(a) Define Fault Modeling?

(b) Define Defects?

(c) Define Errors?

(d) Define Faults?

(e) Define Functional Testing?

(f) Define Structural Testing?

2. (a) Explain VLSI realization Process with Block Diagram? 10M

(b) Explain Briefly about Boundary Scan Test Instructions? 10M

3. (a) Explain Fault Dominance with example? 10M

(b) Explain Briefly about Built-In Logic Block Observers? 10M

4. (a) Explain Fault Collapsing with example? 10M

(b) Explain Equivalence of Single Stuck-at Faults 10M

5. (a) Explain Checkpoint and Checkpoint Theorem? 10M

(b) Explain Differences between Compiled-Code & Event Driven Simulation? 10M

6. (a) Explain Concurrent Fault Simulation? 10M

(b) Explain Controllability & Observability? 10M

7. (a) Explain D-calculus & D-Algorithm? 10M

(b) Explain PODEM Algorithm? 10M

8. (a) Explain Ad-Hoc DFT Methods. 10M

(b) Explain Methods Scan Design and Scan Design Rules? 10M

CPLD and FPGA Architectures
Syllabus

UNIT – I

Programmable Logic: Full Custom, Semicustom, Programmable Logic Devices: Read Only Memory (ROM), PROM, Programmable Logic Array (PLA)/Programmable Array Logic (PAL). Combinational circuit realization using PLA, PAL, PROM.

UNIT – II

CPLDs : Sequential PLDs. PGAs – Features, Programming and applications using CPLDs,- Altera series – Max 5000, Altera series – Max 7000 Series, XC 9500 CPLD architecture and ALTERA FLEX Logic – 10000 Series CPLDs.

UNIT - III

FPGAs: Logic blocks, routing architecture, Design flow, Technology Mapping for FPGAs, Case studies – Xilinx XC4000 & ALTERA's FLEX 8000 FPGAs, ALTERA's FLEX 10000 FPGAs.

UNIT - IV

Design Techniques, Rules, and Verification: Objectives, Hardware Description Languages, Top-Down Design, Synchronous Design, Floating Nodes, Bus Connection, Design for Test, and Testing Redundant Logic, What is Verification? Simulation, Static Timing Analysis, Assertion Languages & Formal Verification.

UNIT - V

Electronic Design Automation Tools: Objectives, Simulation Software, Test Bench Generators, In situ Tools, Synthesis Software, Automatic Test Pattern Generation (ATPG). Scan Insertion Software, Built-In Self-Test (BIST) Generators, Static Timing Analysis Software, Formal Verification Software, Place and Routing Software, Programming Tools.

Text Books:

1. Michael D.Celetti "Advanced Digital Design with the Verilog HDL" Prentice Hall, 2009
2. Bob Zeidman "Designing with FPGAs & CPLDs" Focal Press, 2002.

Reference Books:

1. Charles H.Roth Jr "Digital System Design using VHDL" Thomson, 2008
2. Stephen Brown Zvonko Vranesic "Fundamentals of Digital Logic with VHDL Design" McGraw-Hill, 2008

CPLD and FPGA Architectures
Model Question Paper

[Answer any five of the Following Questions]

1. (a) Describe briefly about Full Custom & semi Custom IC Design. 10M

(b) Differentiate between Channeled and Channel less Gate array? 10M

2. Explain in short about? 10M

(a) Define Programmable Logic?

(b) Mention two or three application areas of Programmable Logic?

(c) Describe Read Only Memory?

(d) Describe the types of Read Only Memory's?

(e) Define Programmable Logic Array (PLA)?

(f) Define Programmable Array Logic (PAL)?

3. (a) Define CPLD? and Explain the Architecture of CPLD? 10M

(b) Explain ALTERA – Max 5000/7000 Series? 10M

4. (a) Explain the Design flow & Technology Mapping for FPGAs. 10M (b) Explain ALTERA's FLEX 8000 Series FPGAs. 10M

5. (a) Explain Applications using MAX 7000 Series FPGAs? 10M

(b) Explain Briefly about Place and Routing Software? 10M

6. (a) Explain Briefly about Hardware Description Languages? 10M

(b) Explain Briefly about Assertion Languages & Formal Verification? 10M

7. (a) Explain about Simulation Software? 10M

(b) Explain about Scan Insertion Software? 10M

8. (a) Explain Briefly about Formal Verification Software? 10M

(b) Explain Briefly about Place and Routing Software? 10M

WAVELETS IN DIGITAL IMAGE PROCESSING
Syllabus

Unit-I:
Digital Image Fundamentals: Introduction, An image model, sampling & quantization, basic relationship between pixels, imaging geometry. Image Transforms: DCT, Walsh transforms, Hadamard, Haar transform, KL transform and their properties.

Unit-II:
Basic Concepts of Reconstruction Algorithms: Problem statement, Transfer methods, Series expansion methods, Optimization criteria, Blob basis functions, Computational efficiency.

Unit-III:
Wavelet based Image Compression: Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Fast Wavelet Transform, 2-D wavelet Transform.

Unit- IV:
Wavelet Transform: Pyramid and Cascade Algorithms, Daubechies Wavelets, Smoothness, Approximation, Boundary Filters and Wavelets, Time-Frequency and Time-Scale Analysis, Second-Generation Wavelets.

Unit- V:
Construction of wavelets: Necessary ingredients for wavelet construction, construction of semiorthogonal spline wavelets, Construction of orthonormal wavelets, Orthonormal scaling functions.

Text books:

1. Digital Image Processing, 3rd Edition, by Rafael C Gonzalez and Richard Woods. Publisher: Pearson Education.
2. Fundamentals of Computerized Tomography: Image Reconstruction from Projections by Gabort Harmon, Springer, 2009.
3. Strang, and Nguyen. Wavelets and filter banks. Wellesley-Cambridge Press,1997.
4. Jaideva C.Goswami and Andrew K.Chan, " Fundamentals of Wavelets" Wiley publishers, 2006 ISBN 81-265-1032-3

References:
1. K.P.Soman and K.I Ramachandran, " Insight into Wavelets – from theory to practice" PHI, Second edition,2008 ((ISBN 978-81-203-2902-7).
2. P.P.Vaidyanathan, "Multirate systems and Filter Banks" Pearson education, 2008, ISBN 978-81-7758-942-9

WAVELETS IN DIGITAL IMAGE PROCESSING

Model Question Paper

Time: 3 hours Max. marks: 100
ANSWER ANY FIVES QUESTIONS

1) Define the following transforms and explain their properties.

a) Hadamard Transform [10]

b) Discreate cosine Transform. [10]

2. a) Give the Basic Concepts of Reconstruction Algorithms. [10]

b) Explain the Blob basis function. [10]

3. a) Explain Wavelet based Image Compression. [10]

b) Explain Fast wavelet transform [10]

4. a) Explain Pyramid and Cascade Algorithms, Daubechies Wavelets [10]

b) Discuss briefly about Second-Generation Wavelets. [10]

5. What are the necessary ingredients to construct wavelets? Explain about [20]

semiorthogonal spline wavelets?

6. a) Explain sampling & quantization. [10]

b) Briefly Explain about basic relationship between pixels [10]

7. Explain Multiresolution analysis and its scaling functions. [20]

8. Explain the Construction of orthonormal wavelets. [20]

WAVELET THEORY AND APPLICATIONS
Syllabus:

UNIT I: INTRODUCTION
Stationary and non-stationary signals, Signal representation using basis and frames, Brief introduction to Fourier transform and Short time Fourier transform, Multi resolution formulation: Wavelets from filters, Classes of wavelets: Haar, Daubechies, bi-orthogonal.

UNIT II: CONTINUOUS WAVELET TRANSFORM
Continuous wavelet transform(CWT), Time and frequency resolution of the continuous wavelet transform, Construction of continuous wavelets: Spline, orthonormal, Inverse continuous wavelet transform, Redundancy of CWT, Zoom property of the continuous wavelet transform, Filtering in continuous wavelet transform domain.

UNIT III: DISCRETE WAVELET TRANSFORM AND FILTERBANKS
Orthogonal and bi-orthogonal two-channel filter banks, Design of two-channel filter banks, Tree-structured filter banks, Discrete wavelet transform, Non-linear approximation in the Wavelet domain, multiresolution analysis, Construction and Computation of the discrete wavelet transform, the redundant discrete wavelet transform.

UNIT IV:MULTI RESOLUTIONANALYSIS
Multirate discrete time systems, Parameterization of discrete wavelets, Bi-orthogonal wavelet bases, Two dimensional, wavelet transforms and Extensions to higher dimensions, wave packets

UNIT V: APPLICATIONS
Signal and Image compression, Detection of signal changes, analysis and classification of audio signals using CWT, Wavelet based signal de-noising and energy compaction, Wavelets in adaptive filtering, Adaptive wavelet techniques in signal acquisition, coding and lossy transmission, Digital Communication and Multicarrier Modulation, Trans multiplexers, Image fusion, Edge Detection and object isolation.

TEXT BOOKS:
1. A Wavelet Tour of Signal Processing, 2nd edition, S. Mallat, Academic Press, 1999.
2. Wavelets and Subband Coding, M. Vetterli and J. Kovacevic, Prentice Hall, 1995.
3. Wavelet transforms: Introduction, Theory and applications, Raghuveerrao and AjitS.Bopardikar, Pearson Education Asia, 2000.

REFERENCES:
1. Fundamentals of Wavelets: Theory, Algorithms, and Applications, J.C. Goswami and A.K. Chan, 2nd ed., Wiley, 2011.
2. Wavelets and their Applications, Michel Misiti, Yves Misiti, Georges Oppenheim, Jean-Michel Poggi, John Wiley & Sons, 2010 .
3. A premier on Wavelets and their scientific applications, J S Walker, CRC press, 2002.
4. Wavelets and signal processing: An application based introduction, Stark, Springer, 2005.
5. A friendly guide to Wavelets,Gerald keiser,Springer,2011.
6. Multirate Systems and Filter Banks, P. P. Vaidyanathan, Pearson Education,2004.
7. Wavelets : from math too practice,Desanka.P.Radunovik, springer, 2009.
8. Insight into wavelets from theory to practice,K P Soman and KL Ramachandran, PHI, 2008.

WAVELET THEORY AND APPLICATIONS

Model Question Paper

Time: 3 hours Max. Marks: 100

ANSWER ANY FIVES QUESTIONS

1. a) Explain the Signal representation using basis and frames. [10]

b) Discuss the Classes of wavelets: Haar, Daubechies, bi-orthogonal. [10]

2. a) Explain the Time and frequency resolution of the continuous wavelet transform. [10]

b) Explain the Filtering in continuous wavelet transform domain. [10]

3. a) Explain the Orthogonal and bi-orthogonal two-channel filter banks. [10]

b) Explain Discrete wavelet transform. [10]

4. a) Explain the Bi-orthogonal wavelet bases. [10]

b) Explain wavelet transforms and extensions to higher dimensions. [10]

5. a) Discuss the analysis and classification of audio signals using CWT. [10]

b) Explain Edge detection and object isolation. [10]

6. Explain the following

a) Continuous wavelet transform [10]

b) Redundancy of Continuous wavelet transform [10]

7. a) Discuss about the design of two channel filter banks [10]

b) Explain orthogonal two-channel filter banks. [10]

8 Explain Wavelet based signal de-noising and energy compaction. [20]

ADVANCED DIGITAL SIGNAL PROCESSING
SYLLABUS

(Prerequisite: Digital Signal Processing)

Unit-I

Computation of the Discrete Fourier Transform: FFT Efficient computation of the DFT, FFT Algorithms -Direct computation of the DFT- Radix – 2 FFT algorithm- Radix – 4 FFT algorithm - implementation of FFT algorithms. A linear Filtering approach to computation of the DFT - The Geortzel algorithm The chirp – Z Transformation algorithm- Quantization errors in the direct computation of the DFT and FFT algorithms.

Unit II

Design of Digital Fitters and Realizations.

FIR Filters- Design of Linear Phase FIR Filters using Windows- Design of Linear Phase FIR Filters by the Frequency Sampling method-Design of Optimum Equiripple Linear Phase FIR Filters. Realization of FIR filters. IIR – Filters - IIR Filter Design by Impulse Invariant method-IIR Filter Design by the Bilinear Transformation-Butterworth Filters – Chebyshev Filters - Frequency transformations. Realization of FIR filters.

Unit III

Multirate Digital Signal Processing

Decimation by a factor D- Interpolation by a factor I - sampling rate conversion by a rational factor I/D - sampling rate conversion by an arbitrary factor, Digital filter banks, Applications of Multirate DSP.

Unit IV Adaptive filters

Adaptive Direct form FIR filters- The LMS algorithm, Minimum Mean square Error criterion, The LMS algorithm, Related Stochastic Gradient algorithm, Properties of LMS algorithm.

Adaptive Direct form filters: RLS algorithm, Properties of RLS algorithm.

Applications of Adaptive filters: System Identification or System modeling, Adaptive channel equalization, Echo cancelation in Data transmission over telephone channels, Suppression of Narrowband interference, Adaptive line enhancer, Adaptive Noise cancelling, Linear predictive coding of speech signals, Adaptive arrays.

Unit V

Power Spectrum Estimation

Estimation of spectra from Finite Duration Observations signals – Non-parametric methods for power spectrum Estimation – parametric method for power spectrum Estimation.

Text Books :

1 Digital Signal Processing -principles, algorithms and Applications – John G.Proakis and Dimitris G.Manolakis –Fourth Edition- PHI

Reference Books

1 Digital Signal Processing – Alan V.Oppenheim and Ronald W.Shafer -PHI
2 Digital signal processing- Sanjit K. Mitra-TMH- Second edition

ADVANCED DIGITAL SIGNAL PROCESSING
Model paper

Answer any five questions Max marks:100

1. Compute the 16-point DFT of the sequence using Radix-4 DITFFT algorithm.

2.(a)Compute the eight point DFT of the sequence

Using the radix-2 decimation-in-frequency algorithm.

b) Explain how the Goertzel algorithm is attractive when the DFT computed at $M \leq \log 2N$.

3. (a) Discuss about the pole locations for the digital Chebyshev filters.

(b)Using a Hamming window technique design a low pass filter with pass band gain of unity, cut-off frequency of 1kHz and working at a sampling frequency of 5 kHz. The length of the impulse response should be 7.

4. Determine the system function H(Z) of the lowest order Chebyshev digital filter that meets the following specifications. Use Bilinear transformation.

(i) 1-dB ripple in the passband

(ii) at least 60 dB attenuation in the stopband

5. Consider the signal x(n) = n u(n)

(a) Determine the spectrum of a signal.

(b) The signal is applied to a decimator that reduces sampling rate by a factor by '3'. Determine its output spectrum.

(c) Show that the spectrum in part (b) is simply Fourier transform of x(3n).

6. (a) Obtain cascade and parallel structures for the system described by

. [] 0.1[1]0.72[2]0.7[]0.252[2] ynynynxnxn□ □□□□□□□

(b) Consider an FIR filter with system function

1 2 3 4 [] 12.883.40483.40480.4Hzzzzz□□□□□□ □□□

Sketch the direct form and lattice realizations of the filter and determine in detail the corresponding input and output equations. Is the system minimum phase?

7. (a) Explain how a narrowband interference is suppressed in wideband signal.

(b) Explain Related Stochastic Gradient Algorithms.

8. (a) Derive the mean and variance of the power spectral estimate of theBlackman and Tukey method.

(b) The discrete time sequence is given by where

n=0,1,2,….15. Evaluate the power spectrum at frequencies f=k/16 and k=0,1,2,….15.

(b) Explain boundary descriptors

RF SYSTEMS DESIGN
Syllabus

UNIT I:

INTRODUCTION:

REVIEW OF TRANSMISSION LINES: Types of Transmission Lines-Equivalent Circuit representation-R, L, C, G parameters of Different Line configurations-Terminated Lossless Transmission Lines-Special Terminations: Short Circuit, Open Circuit and Quarter Wave Transmission Lines- Sourced and Loaded Transmission Lines: Power Considerations, Input Impedance Matching, Return Loss and Insertion Loss.

UNIT II:

RF FILTER DESIGN:

Scattering Parameters: Definition, Meaning, Chain Scattering Matrix, Conversion Between S- and Z-parameters, Signal Flow Chart Modelling, Generalization-Basic Resonator and Filter Configurations: Low Pass, High Pass, Band Pass and Band Stop type Filters-Filter Implementation using Unit Element and Kuroda's Identities Transformations-Coupled Filters.

UNIT III:

ACTIVE RF COMPONENT MODELLING:

RF Diode Models: Nonlinear and Linear Models-Transistor Models: Large Signal and Small Signal BJT Models, Large Signal and Small Signal FET Models- Scattering Parameter, Device Characterization.

UNIT IV:

MATCHING AND BIASING NETWORKS:

Impedance Matching Using Discrete Components: Two Component Matching Networks, Forbidden Regions, Frequency Response and Quality Factor, T and Pi Matching Networks-Amplifier Classes of Operation and Biasing Networks: Classes of Operation and Efficiency of Amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT V:

RF TRANSISTOR AMPLIFIER DESIGN:

Characteristics of Amplifiers- Amplifier Power Relations: RF Source, Transducer Power Gain, Additional Power Relations-Stability Considerations: Stability Circles, Unconditional Stability, And Stabilization Methods-Unilateral and Bilateral Design for Constant Gain- Noise Figure Circles- Constant VSWR Circles.

RF OSCILLATORS AND MIXERS: Basic Oscillator Model: Negative Resistance Oscillator, Feedback Oscillator Design, Design steps, Quartz Oscillators- Fixed Frequency High Frequency Oscillator -Basic Characteristics of Mixers: Concepts, Frequency Domain Considerations, Single Ended Mixer Design, Single and Double Balanced Mixers.

TEXT BOOKS:

1. Reinhold Ludwig and Powel Bretchko," RF Circuit Design – Theory and Applications", Pearson Education Asia, First Edition.
2. Joseph . J. Carr, "Secrets of RF Circuit Design", McGraw Hill Publishers, Third Edition.

REFERENCES:

1. Mathew M. Radmanesh, "Radio Frequency & Microwave Electronics", Pearson Education Asia, Second Edition, 2002.
2. Ulrich L. Rohde and David P. New Kirk, "RF / Microwave Circuit Design", John Wiley & Sons USA, 2000.
3. Roland E. Best, "Phase - Locked Loops: Design, simulation and applications", McGraw Hill Publishers 5^{TH} edition 2003.
4. Devendra K.Misra,"Radio Frequency and Microwave Communication Circuits – Analysis and Design "John Wiley & Sons, Inc.

RF SYSTEM DESIGN
Model Question Paper

ANSWER ANY FIVES QUESTIONS

1.a. For the reflection coefficients and characteristic impedances given, find the reflecting impedance in each case: (10 M)

(i) $\Gamma = 0.7 \angle 30^0$, $Z_0 = 50\Omega$ (ii) $\Gamma = 0.9 \angle -35^0$, $Z_0 = 100\Omega$ (iii) $\Gamma = 0.1 - j0.2$, $Z_0 = 50\Omega$

(iv) $\Gamma = 0.5 - j0$, $Z_0 = 600\Omega$

b. What is a standard Smith chart? What range of resistor and reactive values is mapped into a standard Smith chart?

2. What are the linear and nonlinear models for RF diodes? Explain them clearly. (20M)

3. With the help of kuroda identities and Richards transformations, realize the conversion between lumped and distributed circuit designs. (20 M)

4. a. Explain in detail the stability circles, noise figure circles. (10M)

b. list of steps involved in amplifier and oscillator design considerations. (10 M)

5. a. Explain the importance of impedance matching and explain it using discrete components.(10 M)

b. what are different classes of amplifier ?derive the expressions for efficiency for any two configurations. (10 M)

6. a. Derive S- parameters for a two port network. (10 M)

b. Explain all the basic theory behind the various methods of Signal Flow graph Modeling. (10 M)

7. A BJT is operated in a 50Ω circuit at 1.5 GHz. For the bias conditions of 4 mA collector current and collector- emitter voltage of 10 V, the manufacturer provide the S- parameters in magnitude and angle as follows:

$S_{11} = 0.6 \angle -127^0$; $S_{21} = 3.88 \angle 87^0$; $S_{12} = 0.039 \angle 28^0$; $S_{22} = 0.76 \angle -35^0$.Find (a) the Z – parameters and (b) the h- parameters representation. (20 M)

8. a) Define the following terms for a transmission line.

i) Standing wave ratio ii) Return loss iii) Power in dB m iv) characteristic impedance (10 M)

b) Derive the expression for characteristic impedance of a short circuited transmission line.(10 M)

EMI/EMC
Syllabus

UNIT – I

EMI Environment: Sources of EMI, Conducted and Radiated EMI, Transient EMI, EMI –EMC Definitions and Units of Parameters.
EMI Specifications/Standards/Limits: Units of specifications, Civilian Standards and Military Standards

UNIT – II

EMI Control Techniques: Shielding, Filtering, Grounding, Bonding, Isolation Transformer, Transient Suppressors, Cable Routing, Signal control, Component Selection and mounting.

UNIT – III

EMC Design Guidelines: Typical Sub systems in Electronic Equipment, Transmitters, Receivers, Antenna Systems, Power Supplies, Motors, Control Devices, Digital Circuits, Digital Computers.

UNIT – IV

Choice of Passive Components for EMC: Capacitors, Inductors, Transformers, Resistors, Conductors, Ferrite Beads, Coaxial Connectors, Conductive Gaskets.

UNIT – V

EMI Measurements: EMI Test Instrument / Systems, EMI Test, EMI Shielded Chamber, Open Area Test Site, TEM cell Antennas

TEXT BOOKS:

V P Kodali, Engineering EMC Principles, Measurements and Technologies, IEEE press, 1996.
Bernard Kieser, Principles of Electromagnetic Compatibility, Artech House 3rd Edition, 1986.

EMI/EMC

Model Question Paper

Answer any five questions

1. a) Define EMI and EMC. List out Different Sources of EMI. (10M)

1.b) with practical examples distinguish conducted, radiated and transient EMI. (10M)

2. a) what is the purpose of EMI standards and give different types of standards that will follow in different countries. (10M)

2. b) Give details about EMI specifications and limits with respect to civilian and military standards. (10M)

3. a) How best the filtering technique will help you to reduce the EMI. (10M)

3. b) Give the guidelines for proper bonding and suggest the best suitable bonding (10M) technique for metal joints.

4.a) Explain about EMI signal control technique and cable routing. (10M)

4.b) what should be the precautions that we have to consider in component selection and mounting. (10M)

5.a) Give details about choosing a typical sub system in electronic equipment. (10M)

5.b) what kind of problems that will arise in digital circuits and digital computers with respect to EMI. (10M)

6.a) Give design guidelines for Transmitters, receivers and Antenna systems. (10M)

6.b) Explain about the choice of passive components like resistors, capacitors and conductors in the electronic circuits for EMC. (10M)

7.a) To provide the Electro Magnetic Compatibility what is the purpose of Ferrite beads and conductive gaskets. (10M)

7.b) write short notes on Coaxial cables for EMC. (10M)

8.a) Explain about the operation of EMI shielded chamber in measurement process. (10M)

8.b) what is meant by open area test site and how radiation emission and radiation susceptibility measurements will done? (10M)

Advanced Biomedical Signal Processing

Syllabus

Introduction to Biomedical Signals: Examples of Biomedical signals - ECG, EEG,
EMG - Tasks in Biomedical Signal Processing - Computer Aided Diagnosis. Origin of bio potentials - Review of linear systems - Fourier Transform and Time
Frequency Analysis (Wavelet) of biomedical signals Properties and effects of noise in Biomedical-instruments - Filtering in biomedical instruments.

Concurrent, coupled and correlated processes - illustration with case studies -Adaptive and optimal filtering - Modeling of Biomedical signals - Detection of biomedical signals in noise. Event detection - case studies with ECG & EEG - Independent component Analysis Cocktail party problem applied to EEG signals - Classification of biomedical signals.

Neurological Applications: The electroencephalogram - EEG rhythms & waveform - Categorization of EEG activity - recording techniques-EEG applications-Epilepsy, sleep disorders, brain computer interface.

Modeling of EEG: Linear, stochastic models-Non linear modeling of EEG - artifacts in EEG & their characteristics and processing- Model based spectral analysis - EEG segmentation - Joint Time-Frequency analysis- correlation analysis of EEG channels - coherence analysis of EEG channels. Medical Image format - DICOM, HL-7, PACS

Brain tumor segmentation: Level set method, MRI segmentation , Clustering Methods, K-means algorithm, Fuzzy C-Means algorithm, Edge detection methods, Watershed method, Thresholding methods

References:

1.Bruce, “Biomedical Signal Processing & Signal Modeling,” Wiley, 2001
2.Sörnmo, “Bioelectrical Signal Processing in Cardiac & Neurological Applications”, Elsevier
3.Rangayyan, “Biomedical Signal Analysis”, Wiley 2002.
4.Semmlow, Marcel Dekker “Biosignal and Biomedical Image Processing”, 2004
5.Enderle, “Introduction to Biomedical Engineering,” 2/e, Elsevier, 2005
6.D.C.Reddy , “ Biomedical Signal Processing: Principles and techniques” , Tata
McGraw Hill,
7. M.C.Jobin Christ and Dr.R.M.S.Parvathi, “Magnetic resonance Brain image segmentation, ” International Journal of VLSI design & Communication Systems, vol.3, no.4, pp.121–133, 2012.

Advanced Biomedical Signal Processing

Model Question Paper

ANSWER ANY FIVES QUESTIONS

1.(a). Explain about different Bio-medical signals 10M

(b).Explain different tasks in computer aided diagnosis in Bio-medical signal processing 10M

2. (a). Explain the origin of Bio-potential 10M

(b). Discuss various biomedical instruments 10M

3. (a). Explain about modeling of Biomedical signals 10M

(b).How to detect a noise in Biomedical signals 10M

4.(a).Explain about various Neurological applications 10M

(b).Explain about various recording techniques in electroencephalogram 10M

5. (a).Explain about various modelling in EEG 10M

(b). Explain about EEG segmentation 10M

6. Explain about various Brain tumor segmentation 20M

7(a).Explain about Fuzzy C-means algorithm 10M

(b).Explain about different Medical Image formats 10M

8. Explain about Independent component Analysis for Cocktail party problem applied to EEG signals 20M

BIOMEDICAL ENGINEERING

Syllabus

Components of medical instrumentation system: Bioamplifier, static and dynamic characteristics of medical instruments, bio signal characteristics, Problems encountered with measurements from human beings, organization of cell, and derivation of Nernst equation for membrane resting potential,Generation and Propagation of action potential, conduction through nerve to neuron-muscular junction.

Bioelectrodes: Biopotential, Biochemical Electrodes, Electrical Conduction system of the heart,
Cardiac cycle, relation between electrical and mechanical activities of the heart. Electro physiology ofheart – properties of cardiac muscle, heart, Standard leads, lead vectors, recording of the ECG from the surface, holter monitor and cardiac stress test. Dipole theory of the heart, relationship between the Different ECG leads Interpretation of ECG waveform with respect to electro mechanical activity of the heart. Applications of bioelectric phenomena, artificial heart-lung machine, artificial heart-lung devices, prosthetic heart valves, Components of patient monitoring system, sources of artefacts & their implication, organization and equipments used in ICCU & ITU. Computer assisted patient monitoring system. Patient safety and electro medical equipments

Use of computers in physiological data acquisition and analysis: Applications of Microprocessor and Microcontroller in medicine, Digital filters: FIR and IIR type and their application to biomedical signal filtering, Data reduction techniques, Spectrum analysis, intelligent computing systems in medicine, Introduction to Intelligence and Artificial Intelligence, Heuristic search method, knowledge Based system, ANN architecture and learning algorithms, Evolutionary computing and Genetic Algorithm (EC-GA) Fuzzy Logic and its application in decision making, Application of ANN, EC, GA, FL in Medical data analysis and diagnosis.

Therapeutic equipment: Pacemaker, Defibrillator, Shortwave diathermy and Hem dialysis machine, Neuro-Muscular Instrumentation Specification of EEG and EMG machines, Electrode placement for EEG and EMG recording, Interpretation of EEG and EMG. Respiratory Instrumentation Mechanism of respiration, Spirometry, Pnemuotacho graph Ventilators.
Optical tomography in biomedical imaging, SPECT, PET, Fusion imaging, MRI, Carotid Doppler Telemedicine, Clinical and image-based analysis, Ultrasonography, 2D verses 3D Ultrasonography, Three-dimensional Image Processing Techniques for Computed Tomography Images

TEXT BOOKS:

1. Biomedical Instrumentation and Measurements – Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer, PHI, 2nd Ed, 1980.
2. Medical Instrumentation, Application and Design – John G. Webster, John Wiley, 3rd Ed., 1998.

REFERENCES:

1. Principles of Applied Biomedical Instrumentation – L.A. Geoddes and L.E. Baker, John Wiley, 1975.
2. Hand-book of Biomedical Instrumentation – R.S. Khandpur, TMH, 2nd Ed., 2003.
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1968

BIOMEDICAL ENGINEERING

Model Question Paper

Time: 3hrs Max Marks:100
Answer any five questions

1. A) Explain the origin of Biopotential. (10M)

B) Explain in detail about cell polarization, repolarization and depolarization. (10M)

2. A) Derive Nernst equation for membrane resting potential? (10M)

B) Explain various electrodes that are used to sense bio signals. (10M)

3. A) write down the relation between electrical and mechanical activities of the heart. (10M)

B) What are the applications of FIR and IIR filter to biomedical signal filtering? (5M)

C) What is Computer assisted patient monitoring system? (5M)

4. A) Write short notes on

a) Artificial heart-lung machine b) Artificial heart-lung devices c) Prosthetic heart valves

(10M)

B) What are the Components of patient monitoring system? (10M)

5. A) how can we classify Cardiac arrhythmias by Genetic Algorithm? (10M)

B) Explain the operation of internal pacemaker with block diagrams. (10M)

6. A) Explain how the EEG is recorded using 10-20 electrodes systems. (10M)

B) What are the Medical applications of Microprocessor and Microcontroller? (5M)

C) Draw and explain about ANN architecture. (5M)

7. A) Explain following respiratory equipment. (10M)

a) Spirometer b) Ventilator

B) Give the principle and operation of defibrillator. (10M)

8. A) Write difference between 2D verses 3D? (5M)

B) Explain briefly about Carotid Doppler. (5M)

C) How does you Three-dimensional Image Processing of Computed Tomography scans data? (10M)

MODERN DIGITAL SIGNAL PROCESSING
SYLLABUS

Unit-I

Computation of the Discrete Fourier Transform: FFT Efficient computation of the DFT, FFT Algorithms -Direct computation of the DFT- Radix – 2 FFT algorithm- Radix – 4 FFT algorithm - implementation of FFT algorithms. A linear Filtering approach to computation of the DFT - The Geortzel algorithm The chirp – Z Transformation algorithm- Quantization errors in the direct computation of the DFT and FFT algorithms.

Unit II

Design of Digital Fitters and Realizations.

FIR Filters- Design of Linear Phase FIR Filters using Windows- Design of Linear Phase FIR Filters by the Frequency Sampling method-Design of Optimum Equiripple Linear Phase FIR Filters. Realization of FIR filters.

IIR – Filters - IIR Filter Design by Impulse Invariant method-IIR Filter Design by the Bilinear Transformation-Butterworth Filters – Chebyshev Filters - Frequency transformations. Realization of FIR filters.

Unit III

Multirate Digital Signal Processing

Decimation by a factor D- Interpolation by a factor I - sampling rate conversion by a rational factor I/D - sampling rate conversion by an arbitrary factor, Digital filter banks, Applications of Multirate DSP.

Unit IV Adaptive filters

Adaptive Direct form FIR filters- The LMS algorithm, Minimum Mean square Error criterion, The LMS algorithm, Related Stochastic Gradient algorithm, Properties of LMS algorithm.

Adaptive Direct form filters: RLS algorithm, Properties of RLS algorithm. Applications of Adaptive filters: System Identification or System modeling, Adaptive channel equalization, Echo cancelation in Data transmission over telephone channels, Suppression of Narrowband interference, Adaptive line enhancer, Adaptive Noise cancelling, Linear predictive coding of speech signals, Adaptive arrays.

Unit V

Power Spectrum Estimation

Estimation of spectra from Finite Duration Observations signals – Non-parametric methods for power spectrum Estimation – parametric method for power spectrum Estimation.

Text Books :

1. Digital Signal Processing -principles, algorithms and Applications – John G.Proakis and

Dimitris G.Manolakis –Fourth Edition- PHI

Reference Books

1. Digital Signal Processing – Alan V.Oppenheim and Ronald W.Shafer -PHI
2. Digital signal processing- Sanjit K. Mitra-TMH- Second edition

Model paper
MODERN DIGITAL SIGNAL PROCESSING

Answer any five questions Max marks: 100

1. Compute the 16-point DFT of the sequence using Radix-4 DITFFT algorithm.

2.(a)Compute the eight point DFT of the sequence

Using the radix-2 decimation-in-frequency algorithm.

b) Explain how the Goertzel algorithm is attractive when the DFT computed at $M \leq \log 2N$.

3. (a) Discuss about the pole locations for the digital Chebyshev filters.

(b)Using a Hamming window technique design a low pass filter with pass band gain of unity, cut-off frequency of 1kHz and working at a sampling frequency of 5 kHz. The length of the impulse response should be 7.

4. Determine the system function H(Z) of the lowest order Chebyshev digital filter that meets the following specifications. Use Bilinear transformation.

(i) 1-dB ripple in the passband

(ii) at least 60 dB attenuation in the stopband

5. Consider the signal x(n) = n u(n)

(a) Determine the spectrum of a signal.

(b) The signal is applied to a decimator that reduces sampling rate by a factor by '3'.

Determine its output spectrum.

(c) Show that the spectrum in part (b) is simply Fourier transform of x(3n).

6. (a) Obtain cascade and parallel structures for the system described by

. [] 0.1[1]0.72[2]0.7[]0.252[2] ynynynxnxn□ □□□□□□□□

(b) Consider an FIR filter with system function

1 2 3 4 [] 12.883.40483.40480.4Hzzzzz□□□□□□ □□□

Sketch the direct form and lattice realizations of the filter and determine in detail the corresponding input and output equations. Is the system minimum phase?

7. (a) Explain how a narrowband interference is suppressed in wideband signal.

(b) Explain Related Stochastic Gradient Algorithms.

8. (a) Derive the mean and variance of the power spectral estimate of theBlackman and Tukey method.

(b) The discrete time sequence is given by where $x(n) = \sin(2\pi \cdot 0.12 n) + \cos(2\pi \cdot 0.12 n)$ n=0,1,2,….15. Evaluate the power spectrum at frequencies f=k/16 and k=0,1,2,….15.

Bio-Medical Signal Processing
Syllabus

UNIT 1:
Introduction: General measurement and diagnostic system, classification of signals, introduction to biomedical signals, Biomedical signal acquisition and processing, Difficulties in signal acquisition.

UNIT 2:
Genesis and significance of bioelectric potentials, ECG, EOG, EMG and their monitoring and measurement, Spectral analysis, digital and analog filtering, correlation and estimation techniques, AR / ARMA models, Adaptive Filters.

UNIT 3:
ECG: Pre-processing, Measurements of amplitude and time intervals, Classification, QRS detection, ST segment analysis, Baseline wander removal, wave form recognition, morphological studies and rhythm analysis, automated diagnosis based on decision theory ECT compression, Evoked potential estimation.

UNIT 4:
EEG: evoked responses, Epilepsy detection, Spike detection, Hjorth parameters, averaging techniques, removal of Artifacts by averaging and adaptive algorithms, pattern recognition of alpha, beta, theta and delta waves in EEG waves, sleep stages.

UNIT 5:
EMG: wave pattern studies, biofeedback, Zero crossings, Integrated EMG. Time frequency methods and Wavelets in Biomedical Signal Processing.

REFERENCE BOOKS:

1. Willis J Tompkins, ED. "Biomedical Digital Signal Processing", Prentice-Hall of India, 1996.
2. R E Chellis and R I Kitney, "Biomedical Signal Processing", in IV parts Bio-medical and Biological Engg. And current computing, 1990-91.
3. Special issue on Biological Signal Processing, Proc. IEEE 1972
4. Arnon Kohen, "Biomedical Signal Processing", Volumes I & II, CRC Press.
5. Metin Aray, "Time frequency and Wavelets in Biomedical Signal Processing", IEEE Press, 1999.

Bio-Medical Signal Processing

Model Question Paper

ANSWER ANY FIVE QUESTIONS

1) a) There are four different bandwidths that are used in electrocardiograph. Describe the principle and applications of these bandwidths? Draw the frequency response. 10M
   b) What are the some other techniques of measuring the ST segment level? 10M

2) a) Describe the characteristics of different stages of sleep in terms of frequency, voltage levels. 10M
   b) Explain the EEG rhythms and transients with waveforms. 10M

3) a)Write the differences between static filter and adaptive filter. 10M
   b)Explain the principle of an adaptive filter. 10M

4) Draw and explain the block diagram of ECG preprocessing. 20M

5) a) Classify the signals according to their characteristics and explain in detail. 10M
   b) Explain the genesis of heart sounds. 10M

6) a) Write the properties of auto correlation. 10M
   b) Write the properties of power spectral density. 10M

7) a) Enumerate the origin of biopotentials with example 7M
   b) Explain the use of computers in analysis of biomedical signals. 7M
   c) Explain how time frequency analysis is helpful in biomedical signal processing 6M

8) a) Discuss the electric activity of the heart. What is the significance of the Einthoven's triangle? 10M

   b) Write a note on spectral estimation in biomedical signals. 10M

Medical Imaging

Syllabus

UNIT I

ULTRASOUND IN MEDICINE: Production of ultrasound – properties and principles of image formation, capture and display –principles of A-mode, B-mode and M-mode display – Doppler ultra sound and colour flow mapping – applications of diagnostic ultra sound.

UNIT II

X-RAY COMPUTED TOMOGRAPHY :Priniciples of sectional imaging – scanner configuration – data acquisition system – image formation principles – conversion of x-ray data in to scan image – 2-D image reconstruction techniques –Iteration and Fourier method – types of CT scanners.

UNIT III

MAGNETIC RESONANCE IMAGING :Priniciples of MRI pulse sequence – image acquisition and reconstruction techniques – MRI instrumentation magnetic gradient system RF coils – receiver system functional MRI – Application of MRI.

UNIT IV

RADIO ISOTOPIC IMAGING :Rectilinear scanners – linear scanners – SPECT – PET Gamma camera radio nuclides for imaging – emission computed CT.

UNIT V

INFRA RED IMAGING: Physics of thermography – imaging systems – pyroelectric vidicon camera clinical thermography – liquid crystal thermography.

REFERENCES :

Steve Webb, “The physics of medical imaging”, Adam Hilger, Bristol, England, Philadelphia, USA, 1988.

A. C. Kak, “principles of computed tomography”, IEEE press, Newyork. 2. G. A. Hay, “Medical Image formation perception and measurement”.

Divyendu Sinha & Edward R.Dougherty, “Introduction to Computer Based Imaging Systems”, PHI, 2003.

Medical Imaging

Model Question Paper

ANSWER ANY FIVE QUESTIONS

1. a)Explain the functioning of radioisotopic imaging equipments? 10M

   b) Explain the 3-D image display techniques 10M

2. a) Explain MRI image acquisition and reconstruction techniques 10M

   d) Explain the Applications of MRI 10M

3. a)Explainpyroelectricvidicon camera clinicalthermography ? 10M

   b)Explain liquid crystal thermography? 10M

4. a)Give the principles of sectional imaging. 10M

   b)Give the types of CT scanners. 10M

5. Explain Production of ultrasound, properties and principles of image formation? 20M

6. a) Explain iterative methods of reconstruction in CT? 10M

   b)Explain Fourier based solutions in CT ? 10M

7. a)Explain Radionuclides for imaging? 10M

   b)Explain Choice of radioisotope for imaging ? 10M

8. a) Explain Basic quality-assurance tests for x-ray tests? 10 M

   b) Explain Specific quality-assurance tests? 10M

K L University

Department of EEE

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

ELECTRICAL MACHINE MODELING AND ANALYSIS

SYLLABUS

Unit I: Basic concepts of Modeling

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitive Machine - voltage, current and Torque equations.DC Machine Modeling Mathematical model of separately excited D.C motor – Steady State analysis-Transient State analysis-Sudden application of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations

Unit II: Reference frame theory

Real time model of a two phase induction machine- Transformation to obtain constant matrices-three phase to two phase transformation-Power equivalence. Dynamic modeling of three phase Induction Machine Generalized model in arbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference frame model-Rotor reference frame model Synchronously rotating reference frame model-Equations in flux linkages-per unit model

Unit III: Small Signal Modeling of Three Phase Induction Machine

Small signal equations of Induction machine-derivation-DQ flux linkage model derivation control principle of Induction machine. Symmetrical and Unsymmetrical 2 phase Induction Machine Analysis of symmetrical 2 phase induction machine-voltage and torque equations for unsymmetrical 2 phase induction machine-voltage and torque equations in stationary reference frame variables for unsymmetrical 2 phase induction machine-analysis of steady state operation of unsymmetrical 2 phase induction machine- single phase induction motor - Cross field theory of single-phase induction machine.

Unit IV: Modeling of Synchronous Machine

Synchronous machine inductances –voltage equations in the rotor's dq0 reference frame electromagnetic torque-current in terms of flux linkages-simulation of three phase synchronous machine- modeling of PM Synchronous motor.

Unit V: Dynamic Analysis of Synchronous Machine

Dynamic performance of synchronous machine, three-phase fault, comparison of actual and approximate transient torque characteristics, Equal area criteria

Text Books:

1. R. Krishnan, "Electric Motor Drives - Modeling, Analysis& control", Pearson Publications, 1st edition, 2002.

2. P.C.Krause, Oleg Wasynczuk, Scott D.Sudhoff, "Analysis of Electrical Machinery and

Drive systems", IEEE Press, Second Edition.

Reference Books:

1. P.S.Bimbra, "Generalized Theory of Electrical Machines" Khanna publications, 5th edition-1995

2. Dynamic simulation of Electric machinery using MATLAB / Simulink –Chee Mun Ong-Prentice Hall.

ELECTRICAL MACHINE MODELING AND ANALYSIS

MODEL QUESTION PAPER

Time: 3hrs Max Marks: 100

Answer any five questions 5 X 20 = 100M

1) Write the Voltage & Torque equations for the Kron's primitive machine in matrix form .What observations are mode from the impedance matrix & Torque equation of this machine? (20M)

2) Obtain Mathematical modelling in matrix form for a given separately excited D.C motor? Obtain the transfer function and also write the formulae for undamped natural angular frequency & Damping factor for this machine? (20M)

3) A 3-Ph Induction motor has the following per phase parameters referred to stator:

Stator resistance --- 0.30ohm

Rotor resistance --- 0.45ohm

Stator & Rotor leakage reactance --- 2.1ohm each

Magnetising reactance --- 30.00ohm

Find out the parameters of an equivalent 2-ph induction motor if its per phase turns are :

(a) Same as that of the 3-phase Induction motor. (8M)

(b) 3/2 times that of the 3-phase induction motor. (8M)

(c) Sqrt 3/2 times that of the 3-phase induction motor. (4M)

4) Obtain the expressions for a 3-ph Induction motor (Voltage and Current) in state variable form in

(a) Stator Reference Frame (16M)

(b) Synchronous Reference Frame and Rotor Reference Frame Model. (4M)

5) (a) Derive the equation for Synchronous machine inductances Ls ,Lsr and Lr . (10M)

(b) Obtain the voltage equations in the rotor's dqo reference frame of Synchronous machines. (10M)

6) (a) Explain the dynamic performance of the synchronous machine during the sudden change in input voltage? (10M)

(b) Evaluate the reactance offered by the Synchronous machine during the 3-phase fault conditions. (10M)

7) (a) Explain the equal area criteria for input torque change and 3-phase fault. (10M)

(b) Obtain the Park's Transformation matrix. (10M)

8) Write a short note on following:

(a) Cross-field theory of 1-ph Induction machine. (10M)

(b) Power Equivalence. (10M)

FLEXIBLE AC TRANSMISSION SYSTEMS

SYLLABUS

UNIT-I: FACTS Concept and General System Considerations Introduction to Facts devices, Power Flow in AC system, Dynamic stability Considerations and the importance of the controllable parameters, Definitions on FACTS, Basic types of FACTS Controllers, Basic concept of voltage source converters, Single phase, three phase full wave bridge converters operation, Transformer connections for 12 pulse, 24 and 48 pulse operation.

UNIT-II: CONVERTERS

Three level voltage source converter, pulse width modulation converter, Design of PWM converter to reduce the harmonics, basic concept of current source Converters, Comparison of current source converters with voltage source converters.

UNIT-III: Static shunt Compensators

SVC and STATCOM Operation & characteristics and Control of TSC, TSR, STATCOM, Comparison between SVC and STATCOM – STATCOM for transient and dynamic stability enhancement.

UNIT-IV: Static Series Compensation

GCSC, TSSC, TCSC and SSSC Operation and Control External system Control for series Compensator SSR and its damping – Static Voltage and Phase angle Regulators - TCVR and TCPAR –Operation and Control.

UNIT-V: UPFC and IPFC

The unified power flow Controller – Operation –Comparison with other FACTS devices – control of P and Q – dynamic performance – special Purpose FACTS controllers – Interline Power flow Controller – Operation and Control.

Text Books:

1. N.G Hingorani & L.Gyugyi " Understanding FACTS: Concepts and Technology of

Flexible AC Transmission System" , IEEE Press,2000

2. K.R.Padiyar "FACTS Controller in power Transmission and Distribution" New Age Int

Publisher,2007

Reference Books:

1. Ned Mohan et.al "Power Electronics" John Wiley & Sons

2. T.J.E Miller, "Reactive power control in electric Systems" John Wiley & sons.

FLEXIBLE AC TRANSMISSION SYSTEMS

MODEL QUESTION PAPER

Time:3hrs Max Marks:100

Answer any five questions 5 X 20 = 100M

1. What are the Problems Associated with the present day Power Systems and

explain how FACTS Controllers can provide the solutions.(10M)

2. a. Write about power flow in a meshed system. (10M)

b. Comparison between Voltage Sourced Converter & Current Sourced Converter.(10M)

3. a. Classify the FACTS controllers with neat sketch. (10M)

b. Write about basic concept of Pulse Width Modulation Converter. (10M)

4. Explain basic concept of voltage sourced converter & current sourced converter.(20M)

5. Explain single-phase full wave bridge converter operation with waveforms and

derive the square-wave voltage harmonics. (20M)

6. Discuss about transformer connections for 12-, 24-Pulse operation. (20M)

7. Explain the operation of Three-Level Voltage Sourced Converter with waveforms.(20M)

8. Discuss the power flow and dynamic stability aspects of simple transmission

system, what are the benefits of FACTS Controllers. (20M)

POWER ELECTRONIC CONTROL OF DRIVES

SYLLABUS

Unit-I

Control of induction motor, Review of steady-state operation of Induction motor, Equivalent circuit analysis, torque-speed characteristics. Voltage Source Inverter Fed Induction motor drives &Current Source Inverter Fed Induction motor drives. Control of induction by Slip power recovery schemes.

Unit-II

Vector control of Induction Motor: Principles of vector control, Direct vector control, derivation of indirect vector control, implementation – block diagram; estimation of flux, flux weakening operation.

Unit-III

Control of Synchronous motor drives: Synchronous motor and its characteristics- Control strategies- Constant torque angle control- power factor control, constant flux control, flux weakening operation, Load commutated inverter fed synchronous motor drive, motoring and regeneration, phasor diagrams. PMSM and BLDC control of Drives, control of Variable Reluctance Motor Drive

Unit-IV

Speed control of dc Motors-Different types of speed control techniques by using single phase& three phase ac systems closed loop control of phase controlled DC motor Drives. Open loop Transfer function of DC Motor drive- Closed loop Transfer function of DC Motor drive –Phase-Locked loop control.

Unit- V

Closed loop control of chopper fed DC motor Drives, Speed controlled drive system – current control loop – pulse width modulated current controller – hysteresis current controller – modeling of current controller – design of current controller.

Text Books:

1. Modern Power Electronics and AC Drives –B. K. Bose-Pearson Publications-

2. Electric Motor Drives- R.Krishanan- Prentice Hall, Indian Edition.

REFERENCES:

1. Power Electronics and Motor Control – Shepherd, Hulley, Liang – II Edition, Cambridge University Press

2. Power Electronic Circuits, Devices and Applications – M. H. Rashid – PHI.

3. Fundamentals of Electrical Drives by GK Dubey, Narosa Publishers.

POWER ELECTRONIC CONTROL OF DRIVES

MODEL QUESTION PAPER

Time:3hrs Max Marks:100

Answer any five questions {5 X 20 = 100M}

1. a. Explain about open loop transfer function of dc motor drive (12M)

b. Explain briefly about phase locked loop control (8M)

2. Explain about the fallowing current controllers

a. PWM controller (12M)

b. Hysteresis controller (8M)

3. Explain the fallowing VFI control methods of induction motor drive

a. Open loop v/f control (10M)

b. Current controlled VFI (10M)

4. Discuss about fallowing slip power recovery schemes

a. Static Kramer drive (12M)

b. Static scherbius drive modes of operation (8M)

5. a. Explain principle of vector control of IM (8M)

b. Discuss about direct or feedback vector control (12M)

6. Explain about control strategies of synchronous motor

a. constant torque angle control (10M)

b. constant flux control (10M)

7. a. Explain load commutated inverter fed synchronous motor drive. (10M)

b. Explain about variable reluctance motor drive (10M)

8. a. List and compare various closed loop control techniques of chopper fed DC drives (10M)

b. Explain mathematical modeling of current control loop of chopper fed Dc drive. (10M)

K L University

Department of ENGLISH

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

English Language Teaching: A Back Ground Study
Syllabus

1. Nature & Scope of Linguistics
2. Branches of Linguistics
   a) Applied linguistics
      *Morphology
      *Phonology
      *Syntax
      *Semantics
      *Pragmatics
      *Discourse analysis
   b) Socio linguistics
3. Fundamentals of Language Teaching – Aims, Objectives, Methods, Materials.
4. History of English Language Teaching.
   Major Approaches and Methods of Language Teaching
      * The Grammar Translation Method
      * The Direct Method
      * The Audio Lingual Method
      * Communicative Language Teaching
      * Behaviourist Theory
      *Structural Approach
      * Functional Approach
      * Natural Approach
5. Structure of Modern English

6. Methods of Testing and Assessment.
      * Objectives of test types: aptitude, placement, diagnostic, achievement and proficiency.
7. Use of Technology for Language Teaching.

Books prescribed.

John Lyons. New Horizons in Linguistics
Jack Richards &Theodore Rodgers. 2001. Approaches and Methods in Language Teaching
M.L.Tickoo. 2003. Teaching and Learning English .Orient Longman
Gavin Dudeney. 2007. The Internet in the Language Classroom : A Practical Guide for Teachers.
Context in Language Learning and Understanding. Editors: Kirsten Malankjaee and John Williams.
English Language Teaching Materials: Edited by nigel Harwood and Jack Richards.
From corpus to class Room . Edited by: Anne O Keeffe, Michael , Michael Mccarthy and Ronald Carter.
From Teacher to Manager. Edited by: Ron White, Andy Hockey, Melissa. S. Laughner and Julie Van der Horst Jansen
Teacher Trainer Essentials Edited by: Craig Thaine.
History of English Language Teaching by Dimitrios Tanasoulas
Approaches and Methods in Language Teaching. By Jack c. Richards and Theodore. S. Rodgers.
An Introduction to Sociolinguistics by Ronald Wardhaugh
Companion to Sociolinguistics by Carman Llamas, Peter Stockwell, Louise Mullany

Soft Skills in Academia and Industry
Syllabus

1.Importance of Soft Skills-Definition and components

*critical thinking
*Creative thinking
*Emotional literacy
*Empathy
*Life Skills
*People skills
*Social intelligence
*Theory of multiple intelligences
*Management Skills

2. Need and importance of soft skills in students

3.Importance of soft skills in professional life

*Job skills
*Leadership Skills
*Team building Skills

4.Soft skills at work place

*Strong work ethics
*Positive attitude
*Communication skills
*Time management skills
*Problem solving skills
*Self confidence
*Ability to accept and learn from criticism
*Flexibility and adaptability.
* Working well under pressure..

Books and websites Recommended:

Google search Wikipedia for soft skills

1.**Personality development and soft skills - free eBooks download**
www.gobookee.org/personality-development-and-soft-skills/
2.Andy Bain and David Pritchard : Soft Skills and Barriers to Employment
3.**Recruitment, Retention, Training Strategies - Research and Training ...**
rtc.umn.edu/misc/pubcount.asp?publicationid=51

4.**Effective Recruitment Strategies and Practices**
www.uoc.edu/symposia/.../Recruitment_Strategies__Practices-ebook.pdf

5.**Recruitment, Selection and Retention | Olivia Kyriakidou - Academia ...**
www.academia.edu/880488/Recruitment_Selection_and_Retention
What are the 'Soft Skills' Employer Want? By Alison Doyle

English Language Teaching: A Back Ground Study
Model Question Papers

Time: 3hrs Marks :100

Answer any five questions. All questions carry equal marks.

1. What are the methods of language teaching? Explain why communicative Language Teaching is widely accepted?

2.Discuss the importance of Technology based language teaching?

3.What are the major differences between Methods and approaches of English Language Teaching?

4.Discuss the aspects of error analysis and discourse analysis ?

5. Write short notes on any four of the following.

a. Grammar Translation Method

b. Langue and Parole

c. Testing and evaluation

d. Bilingual Method

e.Task based approach

6. Enumerate the importance of Sociolinguistics?

7. What are the methods of Testing and Evaluation in a teaching learnig process?

8. Differentiate between conventional and modern pedagogy?

Soft Skills in Academia and Industry

MODEL PAPER

Time: 3hrs Marks :100

Answer any five questions .All questions carry equal marks

1. 'Soft skills is the demanding study in Recruitment and Retention Processes in Academia and Multi National Companies' explain?
2. What are the needed employability skills to be placed in multinational companies?
3. Do you think that there is any relevance between the syllabus of English taught in institutions and the recruitment processes?
4. 'Soft skills cannot be taught but they should be learnt implicitly' Justify the statement?
5. What are the barriers to employment? Can they be overcome and how?
6. Enumerate the importance of management skills in Academia and Industry?
7. 'Team building is an essential quality to work in a Multi National Company' How can this skill be retained in Industry?
8. What do you mean by non-verbal communication? Illustrate with suitable explanation?

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K L University

Department of MANAGEMENT

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

Advanced Management-Theory And Practice
Syllabus

UNIT–I: Introduction to Management: Management Thought; Functions and Principles of Management; Corporate social responsibility.

UNIT-II: Planning: Planning Premises; Types and Steps in Planning; Decision making and forecasting; Decision making process and Decision Tree Analysis.; Management by objectives (MBO).

UNIT-III: Organizing: Organization Structure; Types of Organizations; Principles of Organizing,; Delegation; Decentralization of Authority - Line and Staff functions; Parkinson's law

UNIT-IV: Leading: Leadership; Styles of leadership; Theories of Leadership: Blake and Mouton's Managerial Grid; Motivation, Process, Maslow's and Hertzberg 'sTheories of Motivation; Peter's principle; Douglas McGregor's theories on Assumptions of Human Behaviour.

UNIT-V: Controlling: Importance, Process of Controlling; Making controlling effective; Techniques of Controlling.

Text Book

Harold Koontz & Heinz Weirich – Management, a Global and Entrepreneurial Perspective, Tata McGraw -Hill Publishing Company – New Delhi. 2008.

Reference Books :

1. Balasubrahmanian. N, Management Perspectives, Mac Millan India Ltd., New Delhi, 2007.
2. Burton Gene & Thakur Manab, Management Today, Principles and Practice, TMH, New Delhi 2004.
3. Charles Hill, Steven McShane, Principles of Management, TMH, New Delhi 2008
4. Hill, McShane, Principles of Management, TMH, New Delhi 2007.
5. Luis Gomez Mejia, David B Balkin, Boulder, Robert Cardy, Management, TMH, New Delhi 2008
6. Sherlakar, Principles and Practice of Management, Himalaya Publishing House Ltd., New Delhi.2007.
7. Stoner, Freeman and Gilbert, Management, Princtice Hall of India Pvt.Ltd, New Delhi.2007

ADVANCED MANAGEMENT THEORY AND PRACTICE

Model Question Paper

Time: 3 Hours Max. Marks: 100

Answer any FIVE of the following questions: 5X20=100

1. A) An organization suffers from the following problems: Most of the employees don't know as to what their roles and duties are such that similar tasks are performed by many people; most often, employees do not have freedom to take decisions; people receive instructions from many sources; employees work according to their own perspectives with divergent objectives; there is, sometimes, confusion as to who is an upper level officer and who is the lower level officer; people are worried about their job security; discipline seems to be lacking; things are not in places where they ought to be; no team spirit; complaints about unequal pay, so on and so forth. Is there any theoretical background wherefrom these irregularities could be addressed? Discuss in the wake of such background. 10

B) Management takes a fiduciary status as regards its various stakeholder classes: What type of responsibility is it? How does it operate? 10

2. A) "A comprehensive managerial system that integrates many key managerial activities in a systematic manner and is consciously directed toward the effective and efficient achievement of organizational and individual objectives." What concept is this? Discuss in the light of its effectiveness. 10

B) The CEO of a certain company often takes decisions haphazardly and naturally ends up in a fiasco. What is wrong with him? Can you suggest to him of something? 10

3. A) In an organization, two broad types of relationships exist. What are they? Are both types required? Discuss their significance and contribution in the smooth functioning of the organization. 10

B) There cannot be something like a universally applicable span of control: substantiate. 10

4. A) Are *management* and *leadership* the same? Discuss and bring out the features of level five leadership. 10

B) As a need of an employee gets satisfied, another need surfaces and so employees might be found to be in a state of dissatisfaction from time to time. Different employees exhibit different levels of dissatisfaction. As a manager, how would you handle such situations?10

5. A) According to one philosophy, *Work expands so as to fill the time available for its completion.* Who is the author of this philosophy? Discuss its relevance in the present day context.10

B) "In a hierarchy, every employee tends to rise to his/her level of incompetence."– Discuss. 10

6. A) Management is confronted with various options while designing strategies: List such possible options available at corporate level with examples. 10

B) List such options at business level with examples 10

7. A) What is the process of benchmarking, measuring and correcting performance to ensure that the enterprise objectives and the plans devised to attain them are being accomplished, called?" How is this process implemented? 10

B) Do internal and external forces necessitate change? How do they operate? 10

8. A.)Justify that management is both an Art and Science! 10

B) What do you mean by delegation? How is effective delegation achieved? 10

Marketing Management
Syllabus

Unit-I:

Need, Want and Demand; Marketing; Marketing Orientations; Marketing Environment; Buyer Behaviour; Marketing Planning Process; Consumer value and satisfaction; Identification and Analysis of Competitors

Unit-II:

Market Segmentation, Targeting and Positioning strategies; Marketing Mix; The product; New Product Development; Product Life Cycle and strategies;; Product Mix decisions; Branding; Packaging and Labeling

Unit-III:

Pricing Decisions; Factors influencing Price – five "C"s; Pricing Strategies; New product pricing; Price adjustment strategies

Unit-IV:

Distribution Decisions; Channel alternatives; Choice of Channel; Channel Management,Channel Dynamics, Managing promotion Mix; Advertising, Personal selling, Sales Promotion and publicity, Integrated Marketing Communication.

Unit-V:

Marketing Control techniques; Marketing Audit; Social Marketing; Green Marketing; Web Marketing; green washing.

Text Books:

1. Philip Kotler and Gary Armstrong - Principles of Marketing - 9th Edition
2. Stanton - Fundamentals of Marketing M

Reference Books:

1. V.S.Ramaswamy and S.Namakumari - Marketing Management
2. Byod Walker et..al , marketing Management, MGH, New Delhi
3. Kotler and Keller, Markering Management, 13th Edition, PHI New Delhi
4. Etzel, walker, Stanton and Pandit, Marketing: Concepts and Cases, TMH – New Delhi
5. Philip Kotler - Marketing Management
6. Case Studies in Marketing - Indian context - R.Srinivas
7. Case study solutions - H.Kaushal
8. Marketing Management - Rajan Saxena

MARKETING MANAGEMENT
Model Question Paper

Time: 3 Hours Max. Marks: 100
Answer any FIVE of the following questions: 5x 20= 100

1. (a) Distinguish between Market Segmentation and Product Differentiation.

(b) Describe the bases that you will use in segmenting the market for the following products

(i) Hair dryer (ii) Low calorie sweetener

2. What are the objectives of Sales Promotion? As a Sales Manager, you have been assigned the task of planning the Sales Promotion program of a ready-to-consume meal. Discuss the steps that you would follow for effective planning and management of the said program.

3. Read carefully the following situations given below and answer the questions mentioned at the end of each case. ABC is a well-known brand in the cement industry. It has a large distribution network of around 8000 plus stockists and 20 C and F agents. During the last decade the company's market share has gradually declined to 15% from earlier 30%. About a couple of years ago, the brand opened its first company-owned retail outlet called "ABC Ki Duniya" (World of ABC). The outlet reassures the customer about the genuine material, and encourages interaction besides displaying a range of refractory and aluminium based products. This type of outlet is also likely to enhance the company's image.

Question : Taking into consideration the cement market and the commoditized nature of the product, comment on the pros and cons of an outlet of this kind. Would such outlets alone enhance sales? Discuss.

4. What are the promotional strategies that you would use during the Growth and Maturity stages of the following products:

(i) Men’s fairness cream (ii) Laptops

5. What are the major considerations involved in designing the marketing organisation? Discuss by taking any example of your choice.

6. Explain the various marketing environment constraints referred to by marketers, for the following sectors giving reasons: (i) Light Commercial Vehicles (LCV) e.g., Cars (ii) Hotels.

7. How does the Product Life Cycle (PLC) influence the marketing mix decisions ? Explain with suitable examples. Present product life cycle to cigarette business.

8. Explain Marketing Control techniques with suitable examples.

FINANCIAL MANAGEMENT
Syllabus

Unit I:

Nature and Scope of Financial Management- Goals & objectives of financial management, Role of Financial Manager -Concept of time value of money.

Unit II:

Sources of long term and short term financing, Overview of Indian Stock Markets.

Unit III:

Capital Budgeting decisions: NPV- IRR - Risk analysis in capital budgeting. RADR, certainty equivalent, decision tree analysis.

Unit IV:

Capital structure decisions: capital structure theories -EBIT &EPS analysis – Financial Leverage- Operating leverage - Cost of capital and WACC.

Unit V:

Dividend decisions: dividend models - dividend theories - Working capital – cash Management - Inventory Management – Receivables management.

Text Books:

1. Khan M. Y. & Jain P. K. – Financial Management
2. I.M Pandey – Financial Management

Reference Books:

3. Archor Strephen h., G. M. Choate, George Racette- Financial Management
4. Kohok- Advanced Financial Management
5. Prasanna Chandra- Fundamentals of Financial management.
6. Shrivastava R. M. – Financial Management & policy.
7. Bhalla V. K. – Financial Management & Policy.
8. Upadhyaya R. C.- Financial Management

Financial Management
Model Question Paper

Max. Time: 3 Hours Max. Marks: 100
Answer any Five of the following questions. Each question carries 20 marks. (5 x 20 = 100 Marks)

1. Comment on the emerging role of the finance manager in India and also discuss the broad area of financial decision making.
2. a. Why does money have time value?
b. A 12-payment annuity of Rs.10,000 will begin 8 years hence. What is the present value of this annuity if the discount rate is 14 percent?
3. Risk is inherent in almost every business decision. Discuss various techniques developed to handle risk in capital budgeting.
4. a. What are the key differences between debt and equity?
b. Why is preference capital considered as a hybrid form of financing?
5. a. State MM's proposition I. With the help of an example illustrate how the arbitrage Mechanism works.
b. What are the implications of Gordon's dividend model?
6. What factors have an important bearing on working capital needs? Discuss the kind of trade off involved in determining the optimal level of current assets.
7. Phonix company is considering three mutually exclusive investments, Project P, Project Q and Project R. The expected cash flows of these projects are as follows:

Year	Project P	Project Q	Project R
0	(2000)	(2000)	(2000)
1	1400	500	500
2	600	1100	500
3	400	900	1600

Calculate the NPV of each project and suggest which project would you choose if the cost of capital is 10% and why?
8. a. Harilal company requires 10,000 units of a cetain item per year. The purchase price per unit is Rs.25; the carrying cost per year is 25 per cent of the inventory value; and the fixed cost per order is Rs.300.
i. Determine the economic order quantity
ii. What will be the total cost of carrying and ordering inventories when 10 orders are placed per year?
b. Abascus Limited issued 15 year, 14 percent bonds five years ago. The bond which has a face value 0f Rs.100 is currently selling for Rs.108.
i. What is the pre-tax cost of debt?
ii. What is the after-tax cost of debt? (Assume a 35% tax rate.

MICRO FINANCE
Syllabus

UNIT I :Over view of Micro Finance - Microfinance Perspectives – Meaning- History of Microfinance in India – nature and structure-Evolution and character of Microfinance in India- Microfinance as a Tool for Development.- Types of products – savings, objectives

UNIT II : Microfinance methodologies - microfinance delivery methodologies-some innovative and creative microfinance models-Conventional Model-Direct Model – Indirect Model- Models in Andhra Pradesh

Unit III: Operational Aspects of Microfinance-Accounting and financial Reporting- Financial Analysis-Revenue Model – Operating cost and Efficiency Microfinance credit lending models – Norms and conditions-Monitoring and Evaluation Findings-Legal and Regulatory Frame work

Unit IV: Micro finance and Development – Microfinance and women Empowerment- Microfinance and Education- Microfinance and Health- Microfinance and Business Development-Microfinance networking and Linkage Building.- measuring of social performance.

Unit V: Risks in Microfinance-Types of Risks in Microfinance-Risks in agricultural Microfinance-Strategies in handling the risks Microfinance and Disaster

Text Books
1. Understanding Microfinance by Debadutta K. panda, Wiley India pvt ltd.
2. Microfinance in India- by N.Srinivasan, Sage Publications

Reference Books
1. Microfinance by Dr. Vinod Kumar, Laxmi Publications Pvt Ltd

Micro finance
Model Question Paper

Max. Time: 3 Hours Max. Marks: 100
Answer any Five of the following questions. Each question carries 20 marks. (5 x 20 = 100 Marks)

1. Elucidate the role of micro finance as a tool for alleviating poverty and discuss its role in a developing country. (20 Marks)

2. Discuss the success story of Bangladesh Grameena bank experiment. (20 Marks)

3. Present different models of micro finance and discuss their strengths and weaknesses.

4. Explain how micro finance can help in women empowerment. (20 Marks)

5. Present an overview of micro finance institutions in India and discuss the role of NGOs in micro finance. (20 Marks)

6. What are the issues involved in micro finance? Indicate the recent incidents that have taken place in India and the underlying reasons. (20 Marks)

7. How to make the functioning of MFIs more effective without jeopardizing the basic purpose of their existence. Give your recommendations. (20 Marks)

8. a. Discuss different types of risks involved in micro finance. (10 Marks)

b. Present the legal and regulatory framework of micro finance. (10 marks)

Mutual Funds
Syllabus

Unit - I: Introduction

Nature and importance of financial services- types of financial services - financial services and economic environment- players in financial services.

Unit -2: Concept and Role of Mutual Funds

History of Mutual Funds in India - Types of Mutual Fund Products - Fund Structures, Fund mergers and Scheme Takeovers

Unit - 3: Investing in Mutual Funds

Process of investing Mutual funds- Investing Objectives –Prospects/Offer document and key information memorandum,- processes, Rights and Obligations of Investor.

Unit - 4: Risk Management in Mutual Funds

Helping investors Understanding Risks in Fund Investing - Investing Philosophy (Value and Growth investment) - Recommending the Model portfolio and selecting the Right Funds.

Unit - 5: Sales and Investor Services to Mutual Funds

Nature and Measuring and Evaluating Mutual Fund Performance: Risk and Performance Evaluation - Measuring Returns - Tracking Mutual Funds Performance.

Text books:

1. Sundar Sankaran, - Indian Mutual Funds Handbook, A Guide for Industry Professionals and Intelligent Investors.
2. M.Y. Khan - Indian Financial System, TMH, 2009
3 . Pathak - Indian Financial System , Pearson Education, 2009.

Mutual Funds
Model Question Paper

Max. Time: 3 Hours Max. Marks: 100

Answer any Five of the following questions. Each question carries 20 marks. (5 x 20 = 100 Marks)

1. Discuss the importance of financial services and explain different types of financial services.

2. Explain different types of mutual fund products in India and discuss the fund structures and fund mergers.

3. What is the role of financial services in changing economic environment and discuss various players in financial services.

4. Do you agree that the regulatory framework for the mutual funds is satisfactory? Present your viewpoints with supporting arguments.

5. What are the objectives and process of investing in mutual funds? Elucidate the investor's rights and obligations.

6. How is NAV calculated? Is it advisable to take the investment decision based on NAV of mutual funds?

7. Explain briefly Value and Growth investment policy? How you Recommend a model portfolio?

8. Explain briefly how you design Mutual Funds Products? Who can invest in Mutual funds in India? Suggest.

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT
Syllabus

UNIT I: Investment Analysis:

Investment Avenues – Objectives of investors – Characteristics of investments – Risk Return relationship – calculation of risk and return – Portfolio diversification Markowitz and sharpe models.

UNIT II: Valuation:

Constant Growth Model- Multiple growth model –Regression analysis ; Bond returns-Bond pricing- bond risks- bond duration.

UNIT III: Fundamental &Technical Analysis:

Fundamental Analysis–Efficient Market Hypothesis- Technical Analysis of market: Dow theory- Principles of Technical Analysis– Elliot wave theory - charts and different indicators.

UNIT IV: Portfolio Selection:

CAPM -Leveraged concept - Pricing of securities under CAPM .APT- construction of equilibrium line and calculation of risk and return.

UNIT V: Portfolio Evaluation and Revision:
Sharpe, Treynor, Jensen differential rate of return, Fama's Decomposition - Strategies in revision of portfolio.

TEXT BOOKS:
1. Security Analysis and Portfolio Management by Kevin – PHI
2. Security Analysis and Portfolio Management by Fisher and Gordon

REFERENCE BOOKS:
1. Security Analysis and Portfolio Management by Prasanna Chandra,TMH
2. Security Analysis and Portfolio Management by Dhanesh Khatri,Macmillan Publishers, New Delhi
3. Security Analysis and Portfolio Management by V.K.Bhalla ,TMH
4. Study of Indian Financial System – V. A. Avadhani
6. Management of Investment by Jack Clark Francis, Mc Graw hill.

Security Analysis and Portfolio Management
Model Question Paper

Max. Time: 3 Hours Max. Marks: 100
Answer any Five of the following questions. Each question carries 20 marks.

1. a. Financial advisers often contend that elderly people should invest their portfolios more conservatively than younger people. Should a conservative investment policy for an elderly person call for owning no common stocks? Discus the reasons for your answer.
b. What factors might an individual investor take into account in determining his or her investment policy?
2. Explain why most investors prefer to hold a diversified portfolio of securities as opposed to placing all of their wealth in a single asset. Use an illustration of the feasible and efficient sets to explain your answer.
3. a. Assume that two secutities constitue the market portfolio. Those securities have the following expected returns, standard deviations and proportions: Security Expected return Standard deviation Proportion
A 10% 20% 0.4
B 15% 28% 0.6
Based on this information, and given a correlation of .30 between the two securities and a risk free rate of 5%, specify the equation for the capital market line.
b. "A security with a positive standard deviation must have an expected return greater than the risk free rate. Otherwise, why would anyone be willing to hold the security?"Based on the CAPM, is the statement correct? Why?
4. Suppose you are asked to analyze two portfolios having the following characteristics:
Portfolio Observed r Beta Residual variance
Portfolio 1 .15 1.5 .02
Portfolio 2 .10 0.5 .00
The risk free rate is 0.05. The return on the market portfolio is 0 .12. The standard deviation of the market portfolio is 0.04.
a. Compute the Jensen index for portfolios 1 and 2.
b. Compute the Treynor index for portfolios 1 and 2 and the market portfolio
c. Compute the Sharpe Index for portfolios 1 and 2 and the market portfolio.
5 Many investors pay attention to technical analysis. Do you agree with the statement? Speculate as to why these investors use this kind of investment research.
6. Discuss different forms of Efficient market hypothesis and discuss the relationship between return and risk in an efficient market.
7. Consider two bonds, each with a Rs.1000 face value and each with three years remaining to maturity.
a. The first bond is a pure-discount bond that currently sells for Rs.816.3. What is its yieldto- maturity?
b. The second bond currently sells for Rs.949.37 and makes annual coupon payments at a rate of 7%9that is, it pays Rs.70 in interest each year). The first interest payment is due one year form today. What is this bond's yield-to-maturity?
8. What is marking to market and maintenance margin requirements?

MICRO INSURANCE
Syllabus

Unit: I- Introduction-Definition and nature of insurance-Evaluation of insurance-role and importance of insurance-Insurance contract-Insurance sector reforms in India

Unit: II- Insurance Legislation in India-Insurance Act 1938-Life insurance Act, 1956-General Insurance Act 1972-IRDA Act, 1999

Unit: III-Micro Insurance-Concept-History-Importance-Growth of Micro Insurance in India

Unit: IV-Micro Insurance-Personal insurance- Property Insurance-Cattle and life stock-Poultry insurance-Insurance of Species-Package Insurance-Group Insurance-Micro Health Insurance in India

Unit: V- Rural Insurance-Legal Framework-Rural insurance policies-Social insurance-Need- Social insurance in India

***Recommended Text Books*:**

1) MN Mishra and SB Mishra, Insurance Principles and Practice, S. Chand, 7th Edition, 2010, New Delhi, ISBN: 81-21901021-8
2) SC Sahoo and SC Das, Insurance Management, Himalaya Publishing House, New Delhi, First Edition: 2009
3) PK Gupta, Insurance and Risk Management, Second Edition, Himalaya Publishing House, New Delhi

MICRO INSURANCE
Model Question Paper

Max. Marks: 100 Time: 3 hours
Answer any Five of the following.

1) A) What are the various principles of insurance

B) The latest and the oldest form of insurance is 'Lloyd's one'. Illustrate briefly.

2) A) What are the various functions of insurance?

B) 'Insurance is not to prevent risk, but to indemnify the losses arising from a certain risk'- Comment

3) A) 'Crop Insurance in India is not very popular'. Discuss it.

B) What is micro insurance? State the need for micro insurance in a developing country like India

4) A) Describe the main kinds of insurance and examine briefly the nature of risks protected by each kind of insurance.

B) 'Insurance is able to curtail inflation, so it should be made compulsory'. Comment

5) A) How far rural masses have been benefited by the rural insurance schemes?

B) What is cattle insurance? How many livestock are insured under cattle insurance?

6) A)Explain briefly the concept of Micro insurance and its development in India

B) Discuss the future of Micro Insurance in India

7) A) Define social insurance and state its main features. List the various provisions of IRDA Regulation on social insurance.

B) List the IRDA Provisions on obligations of insurers to rural sectors.

8) A) Discuss the organizations of insurance business in India.

B) Detail the different kinds of insurance organizations and Illustrate the merits demerits and of each organization.

ENTERPRISE RESOURCES PLANNING
SYLLABUS

Unit-I:

ERP-Introduction; Advantages; ERP and Business – value creation; Integrated Information Management; Enterprise and ERP, Business modeling; Integrated data model

Unit-II:

To ERP or not to ERP – Strategic Options; Benefits of ERP: Quantifiable, Intangible; P&G; People-soft and Oracle Risks: People, process, Technology, Implementation, Operational and Managerial risks.

Unit-III:

Introduction to ERP related technologies- Functional modules of ERP software.

Unit-IV:

Implementation of ERP: Technological, Operational Business reasons, Life cycle; Implementation methodologies, transition strategies;

Unit-V:

People involved in implementation; Success and failure in implementation – factors-
Operation and Maintenance of an ERP system.

4) LEARNING SUPPORT:

a) Recommended Text Book:

1. Enterprise Resource Planning – Alexis Leon – Second Edition – TMH

b) Reference books:

1. Daniel E.O'Leary, Enterprise Resource Planning Systems, Cambridge University Press, 2002.
2. Ellen Monk, Bret Wagner, Concepts in Enterprise resource planning, Cengage learning, Third edition, 2009.

ENTERPRISE RESOURCES PLANNING
Model Question Paper

Max. Marks: 100 Time: 3 hours
Answer any Five of the following 20 X 5 = 100 Marks

1. What are the two types of benefits that ERP would result in? Explain them in detail.

2. Explain several ERP related Technologies in detail.

3. Draw and discuss the three phases of ERP Implementation.

4. Explain different ERP Implementation Strategies in short.

5. Concept of 'Paperless Office' is the one of the major objectives of every business function. How could this possibly happen with ERP?

6. ERP Implementation would bring Value Additions to the organizations. Substantiate this statement.

7. Explain in brief five categories of risk that CTOs should try to mitigate while transitioning from legacy systems to ERP

8. What are the few vigilant steps to follow mitigate any huddles and risks in ERP implementation?

Human Resource Management
Syllabus

Unit-I:

Introduction: Importance and Functions, Scope of HRM, Human Resource Management in a changing environment.

Unit-II:

Manpower Planning: Manpower planning process, Job Description and Job specification, Job analysis and Job design; Techniques of Job design.

Unit-III:

Employee Selection and Development - Recruitment, Selection and Induction, Training and Development, Performance Appraisal. Compensation Planning- Employee Compensation, Job evaluation, Employee Benefits and Welfare, Compensation and Salary Administration

Unit-IV:

Integration and Separation- Employee Discipline, Suspension, Dismissal and Retrenchment; Employee Grievance Handling, Trade Unionism, Collective Bargaining, Industrial Democracy.

Unit-V:
Trends in HRM: Learning Organization, Business Process Reengineering and Role of HRM, Work-life balance, Competency mapping, Cross cultural management, Human Resource Information System, Human Resource Audit and Human Resource Accounting, Total Quality Management and Employee Empowerment.

Text Books:
1. Dessler, Human Resource Management, Pearson Education, Eleventh edition, New Delhi, 2010.
2. K.Aswathappa, Human Resource Management, Tata McGraw Hill, 2010

Reference Books:

1. Raymond Andrew Noe, John R. Hollenbeck, Barry Gerhart, Patrick M Wright, Human Resource Management, The McGraw Hill Pub, 2007
2. Flippo, Edwin B., Personnel Management, Tata McGraw Hill Publishing Co, 2007, New Delhi.
3. H. John Bernardin, Human Resource Management, McGraw Hill Pub, 2007.
4. Johm M Ivancevich, Human Resource Management, McGraw Hill Pub, 2007.
5. V.S.P.Rao, Human Resource Management, Excel publications, 2008
6. Louis & Gomitz Mejia et. al: Managing Human Resources, Pearson Education, 2007.

Human Resource Management
Model Question Paper

Max. Time: 3 Hours Max. Marks: 100
Answer any Five of the following questions. Each question carries 20 marks. (5 x 20 = 100 Marks)

1. Now-a-days Human Resource Management is playing a central role in managing companies. Discuss the factors responsible for this by highlighting the changing environment of Human Resource Management. 20 Marks

2. What do you understand by manpower planning and elucidate the various steps involved in manpower planning process. 20 Marks

3. a. From an HR manager's point of view what are the uses of job analysis? 10 Marks

b. Give job description and job specification for HR manager. 10 Marks

4. a. Suppose a key employee has just resigned and you are the department manager. After you have sent your request for replacement, how could you help the recruiter to find the best replacement. 10 Marks

b. 'A well-thought-out orientation programme is essential for new employees'. Do you agree with the statement and present your supporting arguments. 10 Marks

5. a. The expenditure incurred on training and development of the employees is considered as an investment. Discuss the rationale underlying the statement. 10 Marks

b. How a training and development programme is designed? 10 Marks

6. a. How do the results of performance appraisal affect other HR activities? 10 marks

b. What are the common problems encountered in performance appraisal of employees? 10 Marks

7. As a HR manager what factors do you consider while fixing the remuneration payable to the employees? 20 Marks

8. a. What are the issues involved in cross cultural management? 10 Marks

b. Analyze the role of HR in Business Process Reengineering. 10 Marks

Entrepreneurship
Syllabus

OBJECTIVE

To understand the nature of entrepreneurship as a career option. It also aims at developing therelevant behavioral and entrepreneurial skills and competencies

UNIT I

Entrepreneur - meaning - importance - Qualities, nature types, traits, culture, Similarities and differences between entrepreneur and intrapreneur. Entrepreneurship and economic development - its importance - Role of entrepreneurship – entrepreneurship environment.

UNIT II

Evolution of entrepreneurs - entrepreneurial promotion: Training and developing motivation: factors - Role of consultancy organisations is promoting entrepreneurship - Forms of business for - entrepreneurs.

UNIT III

Project management: Sources of business idea - Project classifications - identifications - formulation and design - feasibility analysis - Preparation of Project Report and presentation. Financial analysis - concept and scope - project cost estimate – operating revenue estimate - Ratio analysis - investment Process - B E analysis – Profitability analysis - Social cost benefit analysis - Project Appraisal methods - Project Report preparation.

UNIT IV

Project finance: Sources of finance - Institutional finance - Role of IFC, IDBI, ICICI, LIC, SFC, SIPCOT, Commercial Bank - Appraisal of bank for loans. Institutional aids for entrepreneurship development - Role of DICS, SIDCO, NSICS, IRCI, NIDC, SIDBI, SISI, SIPCOT, Entrepreneurial guidance bureau - Approaching Institutions for assistance

UNIT V

Setting small scale industries - location of enterprise - steps in setting SSI unit - Problems of entrepreneurs - Sickness in small industries - reasons and remedies - Incentives and subsidies - Evaluating entrepreneurial performance – Rural entrepreneurship - Women entrepreneurship.

TEXT BOOKS:

1. P.Narayana Reddy: Entrepreneurship. Cengage learning, New Delhi,2010
2. Vasanth Desai “Dynamics of Entrepreneurial Development and Management”
Himalaya Publishing House.

REFERENCES:

1. Robert. D. Hisrich, Michael P. Peters and Dean A. Shepherd, “Entrepreneurship”, Tata
McGraw- Hill Publications
2. N.P.Srinivasan & G.P. Gupta “Entrepreneurial Development” Sultanchand & Sons.
3. P.Saravanavelu “Entrepreneurship Development” Eskapee publications.
4. 2. S.S.Khanka “Entrepreneurial Development” S.Chand & Company Ltd.,
5. Satish Taneja, Entrepreneur Development ; New Venture Creation

Entrepreneurship
Model Question paper

Time: 3hrs Max: 100
Marks
Answer any five questions and all questions carry equal marks

1. What is the role of Entrepreneurship in the process of economic development of a country ?

2. Short notes

a) Entrepreneur & Intrapreneur

b) Traits of an Entrepreneur

3. Explain various stages of evolution of Entrepreneurship concept

4. Write various forms of business enterprises

5. Short notes

a) Project classifications

b) B/E analysis

6. Explain the merits & demerits of different project appraisal methods .

7. Write the sources of finance & discuss the role of various financial institutions in promoting business enterprises

8. Short notes

a) Rural Entrepreneurship

b) Problems of MSME's

Management of SME's
Syllabus

Objective: The objective of the course is to help the students understand the dynamics of management of SME's encompassing generation of business idea, setting up an enterprise, raising necessary funds and other management aspects.

Course curriculum:
Unit I: Introduction - The Entrepreneur Definition and concept-Entrepreneur Vs Professional Managers-Nature and Significance of SME's—Institution in Aid of Entrepreneurship Development- Women Entrepreneurs- Problems of Entrepreneurship – Sickness in Small Scale Industries – Reasons and Remedies, problems of SME's

Unit II: Setting up of a SME: Project: Concept and Classification – Generation of Business Idea – Project Design and Appraisal. Location of an Enterprise- Steps for Starting A Small Enterprise- Selection of Types of Ownership Organization- Statutory compliance of SME's- Registration-Permission from Pollution Board-Labour Office - Income tax Department etc.- Patents, Designs,Trademarks.

Unit III: Supporting Institutions and Schemes for Promoting SME-Ministry of Micro Small and Medium Enterprises- SME Chamber of India- Assistance and Support Services within India and Foreign SME Sector, NSIC-National Small Industries Corporation - Khadi and Village Industries Corporation-Coir Board Scheme-Office of Development Commission—Small Industry Service Institute - District Industries Centres- PMRY Scheme and its application process, district level & state level industrial associations.
Unit IV: Financial Institutions providing assistance to SME: SFC-State Finance Corporations - Small Industries Development Bank of India - Industrial Development Bank of India, ICICI, UTI, SBI.

Unit V: Risk Management in SMEs: What is Risk Management- Types of Risk in SMEs- External Risk (Indirect Risk)-Culture-Technology-Government- Economics- Ecological Disasters.-Operational Risk (Direct Risk)-Purchasing-Production-Distribution-Informational Technology. Organizational and Management Risk(Direct Risk)- Company Structure- Management –Personnel,-Financial Risk(Direct Risk)-Capital-Customer Rating- liquidity- Insolvency.

Recommended Text Book(s):
1. Vasant Desai, *The Dynamics'of Entrepreneurial Development and Management,* Himalaya Publishing House, 2009.

Reference Books:
1. Saghir Ahmad Ansari, *Financial Intermediaries and Industrial Development,* APH Publishing Corporation, New Delhi.
2. Matthias Fink, Sascha Kraus, *The Management of Small and Medium Enterprises*, , Routledge Studies in Small Business, 2009.
3. Thomas Henschel, *Risk Management Practices of SMEs. Evaluating and Implementing Effective Risk Management Systems*.
4. Lev & Powell, *Strategies for Growth in SME's*, Elservier Ltd.

Management of SME's
Model Question paper

Time: 3hrs Max Marks: 100
Answer any five questions and all questions carry equal marks

1. Write the following short notes:

a) Women entrepreneurship

b) Significance of micro, small and medium enterprises

2. Explain procedural steps required to start small enterprises with suitable examples

3. Write the following short notes

a) Role of DIC's in promoting SME's

b) Schemes for promoting SME's

4. Describe how ministry of SMEs and other government agencies are playing the role in the development of SME's in India

5. Explain the significance of various financial institutions to give financial back up to SME sector

6. Write the role of district and state level industry associations in the process of growth and development of MSME's with suitable examples

7. Write the short notes on

a) Risk Management

b) Financial Risk & Operational Risk

8. Explain Organizational and Management Risk(Direct Risk) with suitable examples.

Quality Management in Hospitals
Syllabus

Objective: The objective of this paper is to introduce the student to the concept and practice of Quality Management and Control with special reference to Health Care Sector.

UNIT I

Aspects of Quality - Quality mission, policy and objectives; concepts, evolution and determinants of quality; interpretation and process of quality audits; cost of quality and economics of quality. Contribution of Quality Gurus: Shewhart, Juran, Figenbaum, Ishikawa, Deming and Taguchi;SQPC, SQC, CWQC, TPM, TQC.

UNIT II

Total Quality Management - Definition, underlying concepts, implementation and measurement of TQM, Internal Customer Supplier Relationship; QFD, Quality Circles, Quality Improvement teams, team work and motivation in TQM implementation, training and education, role of communication in implementing TQM.

UNIT III

Management of Process I- Process in service organization and their control, simple seven tools of quality control: Check Sheet, Histogram, Scatter diagram, Process Mapping, Cause and Effect diagram, Pareto analysis, control charts and Advanced tools of quality.Management of Process II SQC: Control Charts for variables – X, Xbar, and R charts and control charts for attributes-p, Np, and c charts. Acceptance Sampling Plan and Occurrence. Vendor Selection and Vendor Rating.

UNIT IV

Management of Quality- Facets of quality, quality planning, quality improvement methods. Kaizen, quality audits, medical audit, nursing care standards, Six Sigma, JIT and NABI.

UNIT V

Certification and Accreditation of Hospitals.- ISO Certification: Objectives and Benefits of ISO Certification for Hospitals. Sturcture of ISO 9001: 2000 Standards, Quality Manual: NABH accredition: Basic features: Ideal Approach to Quality.

Reference Books:

1. Srenivasan, N.S. and V. Narayana, Managing Quality – Concepts and Tasks, New Age International, 1996.
2. Shailendra Nigam, Total Quality Management (An Integrated Approach), Excel Books, New Delhi, 2005.
3. James R Evans, James W Dean, Jr., Total Quality (Management, Organisation and Stragtegy), Excel Books, New Delhi.
4. S.K.Joshi: Quality Management in Hospitals : JP Brothers Medical Publishers, New Delhi
5. Sundar Raju, S.M., Total Quality Management: A Premier, Tata McGraw Hill, 1995

Quality Management in Hospitals
Model Paper

Time: 3 Hours Max Marks: 100

Answer Any *Five* Questions. Each question carries 20 Marks.

1 .How do you define Quality in Health Services? Examine the various dimensions of quality in Health Care Services.

2. What is meant by Accreditation of Hospitals? What is the role NABH in Hospital Accreditation in India?

3. Expalin the method of Patient Satisfaction Survey for evaluating the perfromance of hospitals.

4. What is meant by Six Sigma? How the Six Sigma Process ensures quality in an organisation?

5. Define the concept and principles of Total Quality Management and explain its role in Health sector.

6. Explain Juran's 10 steps of continuous quality imprement.

7. What are Control Charts? How are these Charts used in Quality Control?

8. Explain how the processes in a Hospital can be improved using various Quality Controll measures.

FINANCIAL INCLUSION
SYLLABUS

Unit-I: Introduction-Definition-Need- Importance of financial inclusion-Measuring financial inclusion-Indian approach to financial inclusion-Infrastructure limitations-Strategy for building an inclusive financial sector

Unit-II: Role of Commercial Banks- Evolution of Commercial Banks-Product Innovation- Financial inclusion promotion and development-Regional Rural Banks-Coverage of financial inclusion-Potential role in financial inclusion- RRBs as Self Help Promotion Institutions (SHPI)

Unit-III: Micro Finance and Micro Financial Institutions- Definition - Micro Financial Sector (Development and Regulation) Bill, 2007-

Unit-IV: Micro Insurance-Concept-Importance-Growth of Micro Insurance in India-Micro Insurance-Micro Health Insurance in India- Micro-insurance Schemes – ILO- Micro Finance- NBFCs as micro-insurance agents

Unit-V: Technology – The Driving Force for Low-cost Inclusion Initiatives- Optimisation of Existing Infrastructure- International Experiences on Financial Inclusion

Recommended Books:

1) Report on Financial Inclusion by NABARD 2008.
2) MN Mishra and SB Mishra, Insurance Principles and Practice, S. Chand, 7th Edition, 2010, New Delhi, ISBN: 81-21901021-8
3) SC Sahoo and SC Das, Insurance Management, Himalaya Publishing House, New Delhi, First Edition: 2009

Reference:

1) PK Gupta, Insurance and Risk Management, Second Edition, Himalaya Publishing House, New Delhi
2) Harun R Khan, Deputy Governor, Reserve Bank of India at the symposium on "Financial inclusion in Indian Economy" organized by the Indian Institute of Public Administration, Bhubaneswar on June 30, 2012.

Financial Inclusion
Model Question Paper

Max. Marks: 100 Time: 3 hours
Answer any Five of the following 20 X 5 = 100 Marks

1) A) Define Financial Inclusion. Explain the importance of Financial Inclusion in India.

B) What is difference between Financial Exclusion and Social exclusion?

2) A) Describe in detail the scope of Financial Inclusion. What are its uses to the rural community and society as a whole?

B) What are the functions of Regional Rural Banks for coverage of financial inclusion?

3) A) What are the various Strategies for building an inclusive financial sector in India?

B) 'Is Financial Exclusion a problem of India'- Comment

4) What is micro insurance? State the need for micro insurance in a developing country like India.

B) How far rural masses have been benefited by the rural insurance schemes?

5) A) Describe the role of Commercial Banks for the development of financial inclusion in India. Explain

B) Discuss briefly about the Product Innovation and Development by commercial banks in rural areas. Explain

6) A) Define social insurance and state its main features. List the various provisions of IRDA Regulation on social insurance.

B) List the IRDA Provisions on obligations of insurers to rural sectors.

7) A) Explain briefly the concept of Micro Financial Institutions and its development in India.

B) What are the various Micro Insurance schemes in India? Explain

8) A) Discuss the future of Micro Insurance in India

B) Explain the Technology and Infrastructure development for promoting financial inclusions in India.

K L University

Department of MATHEMATICS

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

TOPOLOGY
SYLLABUS

Unit – I Topological Spaces and Continuous Functions

Topological spaces, basis for a topology, the order topology, the product topology on X x Y, the sub space topology, closed sets and limit points, continuous functions, the product topology, the metric topology.

Unit – II Connectedness and compactness

Connected spaces, connected subspaces of the real line, compact spaces, compact subspaces of the real line, limit point compactness.

Unit – III Countability and separation axioms

The countability axioms, the separation axioms, normal spaces, the urysohn lemma, the urysohn metrization theorem.

Unit – IV The Tychnoff Theorem

The Tychnoff Theorem, Completely Regular Spaces, The Stone – Cech Compactification.

Unit – V Complete metric spaces and function spacess

Complete metric spaces, compactness in metric spaces, point wise and compact convergence, ascoli's theorem.

Note : 1. 8 Questions to be set out of which 5 Questions to be answered.
2. Questions should be uniformly distributed from all the units.

Prescribed text Book:

Topology by James Dugundji; Universal Book Stall, New Delhi.
Introduction to Topology by G.F.Simmons; Tata McGraw-Hill Publishing Company.
Reference Text Book:
Topology by James R.Munkres; Prentice-Hall, Second edition.

TOPOLOGY
MODEL PAPER

Attempt any five questions from the following 5x20 = 100M

1. (a) Describe the lower limit topology T in the set R of real numbers. Is T finer than the usual topology on R? Justify.

   (b) Suppose B and B´ are base for topologies T and T´ on a set X. If every is a subset of some? Justify.

2. (a) Describe the dictionary topology on R X R and prove that this topology coincides with the product topology where R equipped with the discrete topology is and the second factor R has the usual topology.

   (b) Show that for a subset A of X, $\bar{A} = A \cup A^{I}$

3. (a) Show that the Cartesian product of connected spaces is connected.

   (b) Give an example of a connected space which is not path connected.

4. (a) Show that a metrizable space X is compact if and only if X is sequentially compact.

   (b) Show that the Cantor set is compact.

5. Which of the following are true? Justify

   (i) If X and Y are second countable so is X × Y

   (ii) If X and Y are Lindelof spaces so is X × Y

6. (a) Show that every regular space with a countable basis is normal.

   (b) Show that a connected normal space having more than one element is normal.

7. (a) S.T a metric space X is complete iff every Cauchy's sequence in X has a convergent sequence.

   (b) If X is a complete topological space ,Show that the space C(X,R) of all continuous real valued functions on X is complete under the metric C defined by $C(f,g)=\sup_{x\in X}\{|f(x)-g(x)|\}$.

8. S.T a metric space X is compact iff X is complete and totally bounded.

SPECIAL FUNCTIONS
SYLLABUS

UNIT-I: The Gamma and Beta Functions

The Gamma function ,A series for $\Gamma'(z)/\Gamma(z)$,Evaluation of $\Gamma'(1)$, the Euler product for $\Gamma(z)$,the difference equation $\Gamma(z+1) = z\Gamma(z)$,evaluation of certain infinite products , Euler 's integral for $\Gamma(z)$, the Beta function , the value of $\Gamma(z)\,\Gamma(1-z)$, the factorial function , Legendre 's duplication formula , Gauss multiplication theorem , a summation formula due to Euler .

UNIT-II: BESSEL FUNCTIONS

Definition of J_n (x) , Bessel's differential equation , Differential recurrence relation, A pure recurrence relation, A generating function, Bessel's integral, Index half an odd integral, modified Bessel function, orthogonality property for J_n (x).

UNIT-III: LEGENDRE'S POLYNOMIALS

Definition of P_n (x) , Differential recurrence relations, the pure recurrence relation, Legendre's differential equation, the Rodrigue's formula , orthogonality property , special properties of P_n (x), more generating functions, Laplace's first Integral form , Expansion of x^n

UNIT-IV: HERMITE POLYNOMIALS

Definition of H_n (x),Recurrence relations , the Rodrigue's formula ,other generating functions ,integrals, the Hermite polynomials as ${}_2F_0$, orthogonality , expansion of polynomial s, more generating functions.

UNIT-V: LAGUERRE POLYNOMIALS

The Laguerre polynomial definition , generating functions, , recurrence relations, the Rodrigue's formula, the differential equation , orthogonality, expansion of polynomials , special properties ,other generating functions , the simple Laguerre polynomials.

TEXT BOOK:
Special functions by E.D. Rainville, MacMillan company, New York, 1960.

SPECIAL FUNCTIONS
MODEL PAPER

Time:3 hours Max Marks:100

Note: Answer ANY FIVE from the following.

1 (a) Find the relation between the beta and the gamma function.

(b) Evaluate $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$.

2 (a) State and prove the Legendre's duplication formula.

(b) Evaluate $\int_0^{\infty} e^{-ax} x^{m-1} \sin bx\, dx$, by using gamma function.

3 (a) Prove the orthogonality property for the Bessel function.

(b) Show that $J_n'(x) = \frac{1}{2}[J_{n-1}(x) - J_{n+1}(x)]$.

4 (a) State and prove the Rodrigue's formula for Legendre polynomials.

(b) Express the polynomial $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$ in terms of Legendre polynomials.

5 (a) State and prove the generating function for Hermite polynomials.

(b) Prove that $2xH_n(x) = 2nH_{n-1}(x) + H_{n+1}(x)$.

6 (a) Show that $\int_0^{\infty} e^{-x} L_m(x) L_n(x) dx = 0,\ m \neq n$.

(b) Evaluate $\int_0^{\infty} e^{-2x} [L_3(2x)]^2 dx$.

7 (a) Using Rodrigue's formula, show that $P_n(x)$ satisfies the differential equation

$$\frac{d}{dx}\left[(1+x)^2 \frac{d}{dx}[P_n(x)]\right] + n(n+1)P_n(x) = 0.$$

(b) Prove that $\int_0^{\infty} e^{-ax} J_0(bx) dx = \frac{1}{\sqrt{a^2+b^2}}$.

8 (a) Evaluate $\int_{-\infty}^{\infty} e^{-x^2} [H_2(x)]^2 dx$.

(b) Prove that $L_n'(x) = L_{n-1}'(x) - L_{n-1}(x)$.

FUZZY ALGEBRA

SYLLABUS

Unit-1 Fuzzy subsets & Fuzzy sub groups

Union of two fuzzy subgroups, fuzzy subgroup generated by a fuzzy subset, fuzzy normal subgroups, fuzzy conjugate subgroups and fuzzy characteristic subgroups, fuzzy syllow subgroups.

Unit-2 Fuzzy sub rings and Fuzzy ideals

Basic concepts, properties of fuzzy ideals, union of fuzzy sub rings (fuzzy ideals), fuzzy sub ring (fuzzy ideal) generated by a fuzzy subset, fuzzy ideals and homomorphism, fuzzy cosets.

Unit-3 Fuzzy prime ideal and Maximal ideals

Fuzzy prime ideals, fuzzy maximal ideals, fuzzy semi prime ideals, characterization of regularity.

Unit-4 Fuzzy primary ideals

Fuzzy primary ideals, fuzzy semi primary ideals definition and some properties, fuzzy ideals and irreducible ideals in Noetherian ring.

Note : 1. 8 Questions to be set out of which 5 Questions to be answered.
2. Questions should be uniformly distributed from all the units.

Prescribed Text Book:
Fuzzy Algebra by Rajesh Kumar ; University Press, University of Delhi, Delhi-110007.

Reference Text Book:
Fuzzy Commutative Algebra by **John N Mordeson & D S Malik;** World Scientific Publishing Co. Pte. Ltd.

FUZZY ALGEBRA
MODEL PAPER

Attempt any five questions from the following **5x20 = 100M**

1. A fuzzy subset μ of a group G is a fuzzy subgroup of G iff, the level subsets μ_t, $t \in$ Im μ, are subgroups of G.

2. For a fuzzy subgroup μ of G, the following statements are equivalent

(i) μ is a fuzzy characteristic subgroup of G.

(ii) Each level subgroup of μ is a characteristic subgroup of G.

3. If $\{\mu_n \mid n \in Z^+\}$ is a collection of fuzzy ideals of a ring R such that $\mu_1 \subseteq \mu_2 \subseteq \mu_3 \subseteq \ldots\ldots \subseteq \mu_n \subseteq \ldots$, then $\cup \mu_n, n \in Z^+$ is a fuzzy ideal of R.

4. Let f be a homomorphism from a ring R onto a ring R´ and let μ be any f - Invariant fuzzy ideal of R, then $R\mu \cong R'f(\mu)$.

5. If f is a homomorphism from a ring R onto a ring R´ and μ' is any fuzzy prime ideal of R´, then $f^{-1}(\mu')$ is a fuzzy prime ideal of R.

6. If μ is any fuzzy prime ideal of a ring R, then $(\sqrt{\mu^2}) = \mu$, where $\mu^2 = \mu \circ \mu$.

7. If μ is any fuzzy primary ideal of a ring R then μ_t, $t \in$ Im μ, is a primary ideal of R.

8. If μ is any fuzzy primary ideal of a ring R, then the ring $R\mu$ is primary.

Hypergeometric Functions and Lie - Groups
SYLLABUS

UNIT-I: THE HYPERGEOMETRIC FUNCTION

The function F (a, b; c; z), A simple integral form, F(a,b;c;1) as a function of the parameters, Evaluation of F(a,b;c;1), The hypergeometric differential equation, F(a, b; c; z) as of its parameters, Elementary series manipulations, Simple transformations, Relation between functions of z and 1-z, A quadratic transformation, Additional properties.

UNIT-II: GENERALIZED HYPERGEOMETRIC FUNCTIONS

The function pFq ,The exponential and binomial functions, A differential equation , other solutions of the Differential equation , A Simple integral , The pFq with unit argument, Saalschutz's Theorem, Whippele's Theorem, Dixon's Theorem, A useful integral.

UNIT-III: THE CONFLUENT HYPERGEOMETRIC FUNCTION

Basic properties of the ${}_1F_1$, Kummer's first and second formula, A theorem due to Kummer. Generating functions : The generating function concept, generating functions of the form $G(2xt - t^2)$, sets generated by $e^t \Phi(xt)$, the generating functions $A(t)\exp(-xt/1-t)$.

UNIT-IV: LIE ALGEBRAIC TECHNIQUE

Lie groups, Lie algebras and one parameter subgroups, homomorphism, linear differential operators, Preliminary observations, The Laguerre function, $L_n^{(\alpha)}(x)$, the hypergeometric function ${}_2f_1(-n, \alpha; \beta; x)$, the modified Laguarre function $L_n^{(\alpha-n)}(x)$.

UNIT-V: THE WEISNER METHOD

Introduction, The differential equation, linear differential operators, group of operators, the extended form of the group generated by B and C, Generating functions for modified Laguerre polynomials, Simple Bessel functions, Gegenbauer polynomials

TEXT BOOK:

Special functions by E.D. Rainville, MacMillan Company, New York, 1960.
A treatise on generating functions by H.M.Srivastva and H.L.Manocha, Halsted/Wiley New York, 1984.
Obtaining Generating functions by Mc.Bride, springer verlag, New York, 1971.

HYPERGEOMETRIC FUNCTIONS AND LIE - GROUPS
MODEL PAPER

Time: 3 hour Max Marks:100

Note: Answer ANY FIVE from the following.

1. Derive the differential equation for the hypergeometric function ${}_2F_1$ (a , b ; c ; z) and express the exponential and the binomial function in terms of hypergeometric function.
2. State and prove the Dixon's theorem.
3. Define the confluent hypergeometric function and derive the Kummer's first and second formula.
4. Explain Lie algebraic (Special linear group SL(2, C)) technique to obtain the generating function.
5. Define a generating function and explain various types of generating functions.
6. Prove that $(1-t)^{-1-\alpha} exp\left(\frac{-xt}{1-t}\right) = \sum_{n=0}^{\infty} L_n^{(\alpha)}(x)t^n$.
7. Derive the recurrence relations of ascending and descending type for ${}_2F_1$ (-n ,a ;b ; x).
8. Write in brief the Weisener's method of deriving generating functions.

K L University

Department of MECHANICAL

Pre-Ph.D. Syllabus & Model Paper for IV Batch (admitted in 2012-13)

Material Science and Metallurgy

UNIT-I

Introduction to Engineering Materials –Properties

Ferrous & Non Ferrous Materials:

Manufacturing method, Properties, Microstructure and Applications of : Gray cast iron, White cast iron, Malleable cast iron, Spheroidal graphite cast iron Classification of steels, Aluminum, copper and its alloys

UNIT-II:

Ceramic Materials: Introduction, applications, Advatages of ceramics, Refractories:Classification ,Properties and applications,Cermets,Abrasives

UNIT-III:

Composite materials: Introduction, classification, advantages, disadvantages and applications

Methods of manufacturing composites:Filament winding process, continuous pultrusion process and lay and hand lay up process

UNIT-IV:

Powder metallurgy:Introduction,Definition,Basic processes, Applications advantages and disadvantages,Characterstics of metal powder, Methods of producing metal powders-Milling ,Atomization , Reduction,

UNIT-V:

Furnaces & its practice: Cupola, Electric arc furnace, Induction type furnace,oxygen steel making process: L-D convertor.

UNIT-VI:

Heat treatment of Alloys : Introduction, advantages, disadvantages and ,applications of heat treatment Annealing, normalizing, Hardening, TTT diagrams, tempering , Hardenability, surface - hardening methods, Age hardening treatment

Material Science & Metallurgy

MODEL PAPER

Answer any FIVE of the following and all questions carry equal marks.

1) Explain Iron –Carbon Diagram with salient features
2) Explain Heat Treatment process? How it should be applicable for

   For Friction Stir welding process
3) Explain effect of alloying elements in steels
4) Describe effects of nano particles in forming processes
5) Explain strain hardening with example
6) Explain recovery, recrystallisation, grain growth with sketches
7) Explain steel manufacturing processes
8) Explain powder metallurgy processes

Welding Technology (Elective)
Syllabus

Introduction: Mechanical & material joining; Material joining by welding, brazing & soldering; Importance of welding in industry; Fusion & solid phase welding; Oxy-fuel welding and cutting; Criteria for progression in welding processes. (6 periods)

Arc Welding Processes: Characteristics of electric arc; Manual metal-arc, gas metal-arc (MIG & MAG, FCAW), Submerged-arc, tungsten-arc inert gas – process characteristics and applications; Power sources for welding; Consumables used in welding; Mode of metal transfer; Design of welded joints. (8 periods)

Advanced Fusion Welding Processes: Electron beam, laser beam, plasma arc – process characteristics and applications. (3 periods)

Solid Phase Welding Processes: Resistance welding – principles, classifications, process characteristics and applications; Friction welding including friction stir & friction plunge welding, explosive welding and ultrasonic welding – process characteristics and applications. (6 periods)
Heat Flow in Welding: Temperature distributions; Residual stresses; Distortions and remedies. (5 periods)

Weld Defects and Their Remedies: Types of defects, causes and remedies. (3 periods)
Introduction to Welding Metallurgy: Iron-Carbon Equilibrium diagram, cooling rates and microstructural phases. (5 periods)

Weldability and Tests for Weldability: Definition and factors affecting weldability; Tests for determining weldability; Weldability of cast iron, stainless steel, aluminum alloys. (6 periods)

Welding
MODEL PAPER

Answer any five questions

1)Explain FSW Process with neat sketch and mechanics of FSW

2) FSW is suitable for Dissimalar materials why?Other processes are not used for Dissimilar materials why?

3)Explain thermal Analysis of FSW

4) Define Flow Stress,strainhardenning. Explain Strain hardening concept

5) What is Thermit welding. Explain Briefly?

6)Discuss effects of tool accuracy on FSW Process.

7)Why gap thickness is important in solid/liquid state bonding processes

8) Advantages and Disadvantages of FSW. Comparisons with other Welding Processes

CELLULAR MANUFACTURING SYSTEMS
SYLLABUS

Concept of group machining:
Terminologies associated with Cellular manufacturing, cell characteristics, objectives of cellular manufacturing, areas of applications of Cellular Manufacturing, benefits – introduction of Cellular Manufacturing, factors influencing success of Cellular Manufacturing, comparison between tradition and Cellular Manufacturing System.

Classification and coding system:
Flow analysis, production flow analysis, component flow analysis, introduction to cell formation techniques, design and manufacturing attributes, cell formation techniques such as rank order clustering, similarity coefficient methods, Classification Identification Algorithms, Data Structures and its influence on solutions, other factors in cell design consideration.

Processing exceptional Cell Manufacturing
: Factors influencing, study of elementary models, algorithms for evaluation of cells such as measures of effectiveness, machine utilization, grouping efficiency, cell efficiency, cell evaluation by points method, measure of cell flexibility, selection of solution, cell size, number of cells and its influence , performance of cells.

Production control activities in cell manufacturing: scheduling
in cell manufacturing, study of elementary models, line balancing in cellular manufacturing, study of elementary models, and inventory control in cellular manufacturing, study of elementary models.

Implementation issues in Cellular Manufacturing:
economic justification of cellular manufacturing, benefits of cellular manufacturing, organizational and behavioral issues in the implementation of cellular manufacturing. Case study on application of cellular manufacturing.

Text Books:
BS Nagendra Parashar (2009), Cellular Manufacturing Systems and Integrated Approach, PHI Publications, New Delhi)

Reference Books:
Nancy L Hayer, Wemmerlov.U (2002), Reorganizing the factory– competing through cellular manufacturing, productivity press publications, USA
Mikell.P.Groover "Automation, Production Systems and computer integrated manufacturing", Pearson Education, 2007.

CELLULAR MANUFACTURING SYSTEMS
Model Question Paper

Max Marks: 100 Time: 3 Hrs

Answer any five Questions from the following (5 x 20 = 100 M)

1. a) Define Cellular Manufacturing and Describe Cell Characteristics and Objectives of the Cellular Manufacturing. (10M)
b) Explain the factors which influence the success of cellular manufacturing system. (10M)

2. a) Obtain machine cells and part families by using Rank Order Clustering (ROC) method for given machine component incidence matrix. (10M)

	Components			
Machines	1	2	3	4
1	1	1	0	0
2	0	0	1	1
3	0	0	1	1
4	1	1	0	0

Figure 1 Machine Component Incidence Matrix of 4M x 4C Problem

b) What do you understand by Production Flow Analysis (PFA)? Discuss various steps involved in PFA. (10M)

3. a) Explain the concepts of Well Structured data and ill structured data in cell design. (10M)
b) Brief any two cell formation techniques in cellular manufacturing. (10M)

4. a) For the block diagonal form shown in Figure2, eliminate exceptional component 4 by using systems approach.
Make the following assumptions:
Assume 8hrs/shift, 3 shifts a day, and 320 working days in a year and operation time (T_o) on both machines (machines 1 and 2) for component 4 is 8 minutes and non-operation time (T_{no}) is 4 minutes.
Cost of machine 1 is Rs.2.0 lakhs, machine 2 is 2.5 lakhs, its life are 8 years, cost of capital 5% and assume a constant cash flow for next 8 years for both machines.
Assume machine hour rate of Rs. 25/hr for subcontracting.
Make suitable assumptions if any other data are missing (15M)

		Components			
		1	2	4	3
M/c's	1	1	1	1	
	4	1	1		
	2			1	1
	3				1

Figure 2 Block – diagonal form for 4M X 4C Problem

b) What are the factors influencing in selecting cell size? Explain in detail. (5M)

5. a) Discuss any two algorithms for evaluation of machine cells for determining the goodness of a solution? (10M)

b) The figure3 shows machine component incidence matrix for10 Machines and 10 components problem, compute exceptional components, exceptional elements and cell efficiency, grouping efficiency, Machine utilization. (10M)

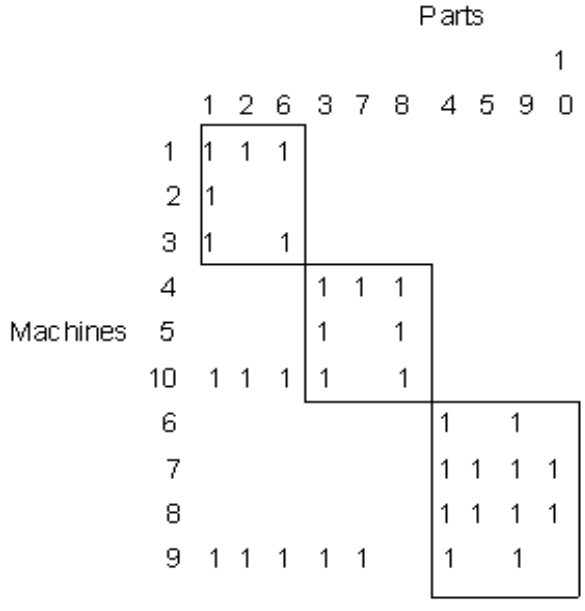

Figure 3 Block – diagonal form for 10M X 10C Problem

6. a) Explain the role of scheduling in cellular manufacturing briefly. (5M)

b)Table-1 shows details of scheduling problem. Table 2 shows machine Component incidence matrix for the problem shown in Table-1. Table 3 shows machine cells and part families formed. Job-Job similarity matrix is shown in table 4. Carry out scheduling in cellular environment using similarity coefficient approach. (15M)

Job	Process Sequence	Due date
1	1(5) – 2(10)- 5(5)	08
2	3(10) -1(5)	14
3	4(5) – 3 (10) – 5(10)	12
4	2(10) – 5(10) – 4(10)	16
5	2(10) – 3(10	14
6	2(10) – 1(5) – 5(10)	18
7	1(10) – 2(10) – 3(5)	16

Table -1 Details of the problem

	1	2	3	4	5	6	7
1	1	1	0	0	0	1	1
2	1	0	0	1	1	1	1
3	0	1	1	0	1	0	1
4	0	0	1	1	0	0	0
5	1	0	1	1	0	1	0

Table-2 Machine Component Incidence Matrix for 5M x 7C problem

.

Cell No.	Machines	Parts
1	1,2,3	1,2,5,6,7
2	4,5	3,4

Table-3 Machine Cells And Part Families for 5M X 7C problem

	1	2	3	4	5	6	7
1	1	0.33	0.33	0.66	0.33	1	0.66
2	0.5	1	0.5	0	0.5	0.5	1
3	0.33	0.33	1	0.66	0.33	0.33	0.33
4	0.66	0	0.66	1	0.33	0.66	0.33
5	0.5	0.5	0.5	0.5	1	0.5	1
6	1	0.33	0.33	0.66	0.33	1	1
7	0.66	0.66	0.33	0.33	0.66	0.66	1

Table-4 Job – Job Similarity Coefficient Matrix

7. a) Explain the role of Line Balancing in Cellular Manufacturing briefly. (5M)

b) Carry out the line balancing in Cellular Manufacturing Environment for the problem shown. Table - 5 depicts job-job similarity co-efficient matrix. Table-6 shows machine cells and part families formed. Figures 4 & 5 shows precedence diagram for Cells 1 and 2 respectively. Assume Cycle time of 10 min. (15M)

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	1	0.33	0	0.33	0.67	1	0	0	0.33	0.67	0
2	0.5	1	0	1	0	0.5	0	0	1	0	0
3	0	0	1	0	0.33	0	1	0.67	0	0	0.67
4	0.5	1	0	1	0	0.5	0	0	1	0	0
5	0.67	0	0.33	0	1	0.67	0.33	0.33	0	0.67	0.33
6	1	0.33	0	0.33	0.67	1	0	0	0.33	0.67	0
7	0	0	1	0	0.33	0	1	0.67	0	0	0.67
8	0	0	1	0	0.5	0	1	1	0	0	1
9	0.5	1	0	1	0	0.5	0	0	1	0	0
10	1	0	0	0	1	1	0	0	0	1	0
11	0	0	1	0	0.5	0	1	1	0	0	0

Table -5 Job - Job similarity Coefficient matrix

Cell No.	**Machines**	**Parts**
1	1,2,3,4	1,2,4,5,6,9,10
2	5,6,7	3,7,8,11

Table -6 Machine Cells and part families for 7M x 11 C Problem

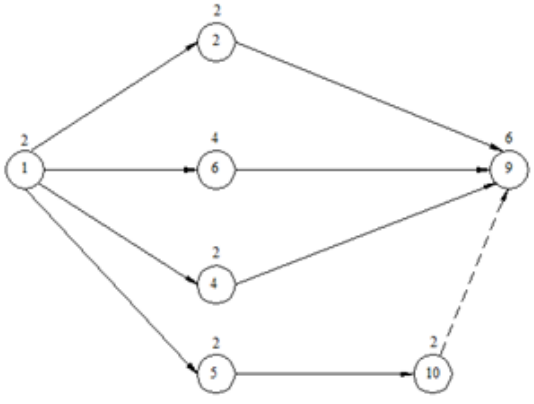

Fig-4 Precedence diagram for cell-1

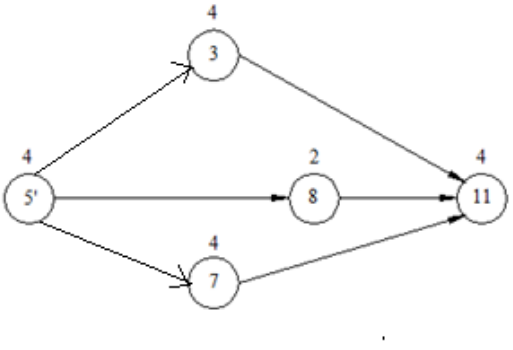

Fig-5 Precedence diagram for cell-2

8. a) List out various technical, organizational and behavioral issues one has to face before cellular manufacturing is implemented? (10M)

b) Compare Traditional manufacturing system with Cellular manufacturing system. (10M)

COMPUTER INTEGRATED MANUFACTURING
SYLLABUS

INDUSTRIAL AUTOMATION: Definition of Automation, Type of Automation, Reason for Automating, Automation Strategies, production concepts, Merits and Demerits of Automation.
NUMERICAL CONTROL: Introduction, Need of Numerical Control, Basic Components of an NC systems, Types of NC systems, Problems with Conventional NC, Direct Numerical Control, Computer Numerical Control.

GROUP TECHNOLOGY: Role of group technology in CAD/CAM integration, Methods for developing part families, Classification and coding- MICLASS, OPITZ, CODE systems, Facility design using group technology, Benefits of G.T., Cellular Manufacturing.
FMS: Components of FMS, Types of FMS, FMS workstation, Material Handling and Storage Systems, FMS Layout, Computer control system, Application and Benefits. FUNDAMENTALS OF CAD/CAM: Computer Aided Design-Application of computers in design, a typical CAD system; Computer aided manufacturing, manufacturing planning and control, Computer Integrated manufacturing.

COMPUTERIZED MANUFACTURING PLANNING SYSTEMS: Computer aided process planning-Retrieval CAPP, Generative CAPP; Benefits of CAPP., Computer integrated production planning systems, Material requirements planning - Fundamental concepts in MRP, Inputs to the MRP system, Benefits of MRP.

SHOP FLOOR CONTROL AND AUTOMATIC IDENTIFICATION TECHNIQUES: Shop floor control, Factory Data collection systems, Automatic Identification systems, Bar code technology, automated data collection systems.

THE FUTURE AUTOMATED FACTORY: Trends in manufacturing, the future Automated Factory, Human workers in the future automated Factory, The social impact.

TEXT BOOKS:
Mikell.P.Groover "Automation, Production Systems and computer integrated manufacturing", Pearson Education, 2007.

REFERENCE BOOKS:
1. Mikell.P.Groover and Emory Zimmers Jr., "CAD/CAM", Prentice Hall of India Pvt. Ltd., 2008.
2. David D.Bedworth, Mark R.Hendersan, Phillip M.Wolfe "Computer Integrated Design and Manufacturing", McGraw-Hill Inc.

COMPUTER INTEGRATED MANUFACTURING
Model Question Paper

Max Marks: 100 Time: 3 Hrs

Answer any five Questions from the following
(5 x 20 = 100 M)

1. a) What are the reasons for Automation and explain different types of automation. (10M)
   b) What are various NC motion control systems? Explain. (10M)

2. a) Explain in brief about Direct Numerical Control (DNC) and Computer Numerical Control (CNC). (10M)
   b) Explain in detail the basic requirements, advantages and methods of classification and coding systems. (10M)

3. a) How can you identify part families in Group Technology. Explain OPITZ coding system with example. (10M)
   b) Explain about concept of cellular manufacturing and benefits of Group Technology. (10M)

4. a) Explain about different types of FMS in detail. (10M)
   b) Explain various FMS Layouts in detail. (10M)

5. a) Explain the importance of application of computers in design. (10M)
   b) Explain about Retrieval CAPP system in brief. (10M)

6. a) Explain about concept of MRP and Inputs to the MRP System (10M)
   b) Discuss briefly about Automatic Identification Systems. (10M)

7. a) Explain briefly about Bar Code Technology. (10M)
   b) Explain about various material handling systems used in FMS. (10M)

8. a) Explain about the impact of future automated factory. (10M)
   b) Explain the reasons for the implementation of automation in a manufacturing firm. (10M)

RELIABILITY ENGINEERING
SYLLABUS

UNIT- 1. Reliability Engineering: Reliability Definition, Reliability numbers, Reliability and Quality, Customer satisfaction, Product life and failure rate, Product design and development cycle, Reliability in design.

UNIT-2. Reliability measures: the reliability function, Probability Density Function, Expected life, the failure rate, Descriptions of reliability.

UNIT-3. Static Models: Static reliability modeling process, Series system analysis, Parallel system reliability analysis, Parallel and series combinations, Design consideration for redundancy, High level versus Low level redundancy.

UNIT-4. Life Distributions: The Exponential distribution, The Normal distribution, Mean life parameters, reliability function, time and mean life formulas, failure rate, mean life reliability, warranty expense calculations.

UNIT-5. Reliability Design Review, Failure Mode & Effect Analysis: Prevention and Corrective Action, Design Review Evaluation, Basics of Design Oriented FMEA, Elements of FMEA, Reliability Growth, Fault Tree Analysis.

TEXT BOOKS
O' Connor, Practical Reliability Engineering
Lewis, Introduction to Reliability Engineering

REFERENCES
Kapur & Lamberson, Reliability in Engineering Design
Lloyd & Lipow, Reliability: Management, Methods and Mathematics

RELIABILITY ENGINEERING

Model Question Paper

Max Marks: 100 **Time: 3 Hrs**

Answer any five Questions from the following

(5 x 20 = 100 M)

1. a). Give a concise definition of : i) reliability, ii) maintainability, iii) overall equipment effectiveness (6)

b). 15 units of a certain automotive component are placed on a life test. The life is measured in kilocycles. The failures occur at 90, 150, 240, 340, 410, 450, 510, 550, 600, 670, 710, 770, 790, 830, and 880. i). Plot the failure density, unreliability and hazard functions based on the above data. ii).What kind of model would you suggest for the hazard function. (14)

2. a). The failure rate of a component is 0.001/hr. i). Find the MTBF ii). Find the R8 iii).What is the probability that the component will not fail in a one month continuous operation (10)

b). Consider a press which consists of the following five subsystems

SUBSYSTEM	MTBF
Crown assemblies	50000 hrs
Slide assemblies	20000 hrs
Gibing	200000 hrs
Columns	10000 hrs
Beds	10000 hrs

i). Calculate the MTBF for the press ii). What is the 8 hour reliability of the press (10)

3. A machine that was designed to produce 360 parts per hour was put under a continuous production test over a 5 day period. During that interval, the machine brokedown 6 times for a total of 14 hours. In addition, the machine was on schedule repair for 4 hours. The parts produced by the machine were inspected. 32000 of the parts passed the inspection, but 1400 of them were rejected. Based on the given information, answer the following questions: (20)

a). Calculate the MTBF

b). Calculate availability

c). Calculate the performance efficiency

d). Calculate the yield

e). Calculate the machine OEE.

4. A). What is a bath-tub curve and explain the three distinct regions of the curve during the product life cycle. (6)

B). Mention the different phases of the product development cycle. (6)

C). A mechanical system has a failure rate of 2.0×10^{-3} /hr. i) What is the systems MTBF ii). What is the systems 500 hr reliability? iii). What is the same systems reliability at 1000 hrs? iv). Evaluate each answer, compare the answers to parts a, b, c and state your observations (8)

5. A). What do you mean by B_{10} life? (5)
B). Given the reliability function, $R(t)=e^{-t/32000}$ $t \geq 0$ where t= time to failure in hours, i). Find the 300 hr reliability ii). Find the 3000 hr reliability iii). Find the B_{10} life. (15)

6. A thermocouple of a particular design has a failure rate of $\lambda=0.0008$/hr. How many thermocouples must be placed in parallel if the system is to run for 100 hours with a system failure probability no more than 0.05. Assume that all failures are independent. (20)

7. A). A component has a normal distribution of failure times with $\mu=20000$ and $\sigma=2000$ cycles. Find the reliability of the component at 19000 cycles (10)
B). Consider the normal N ($\mu=100$, $\sigma=25$) distribution. Calculate the probability that time to failure is between 104 and 106. (10)

8. A). A certain electronic module mounted on an automotive engine has an alleged failure rate of $\lambda=4x10^{-6}$/mile. If this module cost \$85 to replace under warranty, what should the manufacturer budget for warranty expense? The warranty period is 50000 miles. (10)

B). Fifteen automotive switches were cycled and observed for failure. The test was suspended when the fifth failure occurred. Failed switches were not replaced. The failures occurred at the following cycles: 1410, 1872, 3138, 4218, and 6971. When the fifth switch failed, all of the remaining ten pieces on test were suspended each having accumulated the 6971 cycles. (10)
i). Estimate the mean cycles to failure (MCTF)
ii). Set a 90% confidence interval about the MCTF

QUALITY ENGINEERING IN MANUFACTURING
SYLLABUS

UNIT- 1. QUALITY CONCEPTS: Introduction- quality and improvement- objectives- quality assurance-quality systems- Economics- Statistical Tolerances- Quality loss function- link between quality and productivity- TQM: Quality circles- Zero defect programme- ISO.

UNIT-2. STATISTICAL METHODS: Discrete distribution- Hyper geometric, binomial, Poisson distribution- Continuous distribution- Normal, Exponential, Weibull, Gamma distribution- Process variability- charts for attributes, variables, moving average control charts, multivari chart, cumulative chart, demerit chart, process capability studies.

UNIT-3. ACCEPTANCE SAMPLING: Economics of sampling plan- Acceptance sampling plan for variables and attributes- Single, double, multiple, sequential plans- OC Curve- ATI, ASN, AOQL- Standard sampling tables- Dodge romig, Shainian- lot plot planning- Chain Sampling- Continuous sampling plan- CSP1, CSP2, CSP3, Life cycle of acceptance control applications.

UNIT-4. DESIGN OF EXPERIMENT: Factorial experiments- Fractional replication- Taguchi method- Use of orthogonal arrays- Loss function- Minute analysis and life testing- tolerance design- Alternative techniques for off-line quality control- Shainin's approach to experimentation.

UNIT-5. CONTINUOUS PROCESS IMPROVEMENT: Basic concepts of Kaizen, 5s, POKAYOKE, JIT & KANBAN, PDSA cycle, six sigma.

TEXT BOOKS

Quality control – by Montgomory
Managing for total quality – by N. Logothetis
Quality Planning and Analysis – by Juran and Gryna

REFERENCES

Statistical quality control by H. L. Grant
Statistical quality control by Jerry Banks

QUALITY ENGINEERING IN MANUFACTURING

Model Question Paper

Max Marks: 100 **Time: 3 Hrs**

Answer any five Questions from the following **(5 x 20 = 100 M)**

1 a). Explain why there is a loss associated with product meeting specifications but deviating from the target value. (6)
b). What is the difference between quality control and quality improvement Discuss the role of management in each of these settings. (6)
c). What are the advantages of using quality function deployment? What are some key ingredients that are necessary for its success? (8)

2 a). State and explain the central limit theorem. Explain its role in quality control. (2)
b). A 95% confidence interval for the mean thickness of a part in millimeters is (10.2, 12.9). Interpret this interval. (8)
c). It is known that a battery for a video game has an average life of 500 hrs. The failures of batteries are known to be random and independent and may be described by an exponential distribution. (10)
i). Find the probability that a battery will last at least 600 hrs.
ii). Find the probability of a battery failing within 200 hrs.
iii). Find the probability of a battery lasting between 300 and 600 hrs.
iv). Find the standard deviation of the life of a battery.

3. The length of a machined part is known to have a normal distribution with a mean of 100 mm and a standard deviation of 2 mm. (20)
a). What proportion of the parts will be above 103.3 mm
b). What proportion of the output will be between 98.5 and 102.0 mm
c). What proportion of the parts will be shorter than 96.5 mm
d). If the manager stipulates that no more than 5% of the parts should be oversized, what specification limit should be recommended.

4. a). Explain the concept of process capability. When should it be estimated? Discuss its impact on the production of scrap and /or rework. (5)
b). in an electrical circuit, the capacitance of a component should be between 25 and 40 Pico farads. A sample of 25 components yields a mean of 30 pf and a standard deviation of 3 pf. Calculate the process capability index CpK and comment on the process performance. If the process is not capable, what proportion of the product is non-conforming, assuming a normal distribution of the characteristic? (15)

5. A). Define the following: (10)
a). Producer's risk
b). Acceptance Quality Level
c). Consumer's risk
d). Limiting Quality Level

B). Construct the ATI curve for the sampling plan where N=2000, n=50, and c=2 (10)

6. Three adhesives are being analyzed for their impact on the bonding strength of paper in a pulp and paper mill. The adhesives are each randomly applied to four batches. The data is shown in the table below. Here the three treatments are the adhesives (p=3) and the number of replications for each treatment is 4 (r=4).
   Is there a difference among the adhesives in terms of the mean bonding strength? Test at the 5% level of significance. (20)

Adhesive type	Bonding strength				sum	mean
Adhesive 1	10.2	11.8	9.6	12.4	44.0	11.0
Adhesive 2	12.8	14.7	13.3	15.4	56.2	14.05
Adhesive 3	7.2	9.8	8.7	9.2	34.9	8.725
					135.1	11.258

7. Explain the following: (20)
   a). KAIZEN
   b). 5s
   c). JIT
   d). KANBAN
   e). PDSA Cycle
   f). POKAYOKE

8. a). Explain in detail the six sigma quality. (20)
   b). Compare the six sigma quality and the 3 sigma quality.
   c). Is six sigma good for all processes.

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COMPUTER INTEGRATED MANUFACTURING
Model Question Paper

Max Marks: 100 Time: 3 Hrs

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(5 x 20 = 100 M)

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   b) What are various NC motion control systems? Explain. (10M)

2. a) Explain in brief about Direct Numerical Control (DNC) and Computer Numerical Control (CNC). (10M)
   b) Explain in detail the basic requirements, advantages and methods of classification and coding systems. (10M)

3. a) How can you identify part families in Group Technology. Explain OPITZ coding system with example. (10M)
   b) Explain about concept of cellular manufacturing and benefits of Group Technology. (10M)

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   b) Explain various FMS Layouts in detail. (10M)

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   b) Explain about Retrieval CAPP system in brief. (10M)

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   b) Discuss briefly about Automatic Identification Systems. (10M)

7. a) Explain briefly about Bar Code Technology. (10M)
   b) Explain about various material handling systems used in FMS. (10M)

8. a) Explain about the impact of future automated factory. (10M)
   b) Explain the reasons for the implementation of automation in a manufacturing firm. (10M)

Subject Code : (to be given by the department of Mechanical Engg.)

SUPPLY CHAIN MANAGEMENT
SYLLABUS

UNIT I

Logistics and Competitive Strategy – Competitive – advantage – Gaining Competitive Advantage through logistic – The Mission of Logistics Management – Integrated supply chains – Supply Chain and Competitive performance – The changing logistics environment – Models in Logistics Management – Logistics to supply Chain Management – Focus areas in supply Chain Management – performance Measures for SCM.

Customer Service Dimension – The marketing and logistics interface – Customer service and customer retention – Service - driven logistics systems – Basic service capability – Increasing customer expectations – Value added services – Customer satisfaction and success – Time based logistics – Case studies.

UNIT II

Logistics Systems Design: Logistics positioning =- Logistics reengineering – reengineering procedure – logistics environmental assessment – time based logistics – alternative logistics strategies – strategic integration – logistics time based control techniques.

Measuring Logistics Costs and Performance : The concept of Total Cost analysis – Principles of logistics costing – Logistics and the bottom line – Impact of Logistics on Sharcholder value –customer profitability analysis – direct product profitability – cost driver and activity – based costing.

UNIT III

Logistics and Supply chain relationship: Benchmarking the logistics process and SCM operation – Mapping the supply chain processes – Supplier and distributor benchmarking - setting benchmarking priorities – identifying logistics performance indicators – Channel structures – Economics of distribution – channel relationship – logistic service alliances.

Sourcing transporting and pricing products: Sourcing decisions in supply chain – transportation in the supply chain – transportation infrastructure – supplier of transport services – basic transportation economics and pricing – transportation documentation – pricing and revenue management in the supply chain – Coordination in the supply chain – pricing and revenue management in supply chains.

UNIT- IV

Coordination and Technology in Supply chain: Lack of coordination and Bullwhip Effect – Impact of lack of coordination – obstacle to coordination – managerial levers to achieve coordination – Building strategic partners and trust within a supply chain. Role of IT in the supply chain – Customer Relationship Management – Internal supply chain management – Supply chain IT in practice – Information technology and the supply chain – E – business and the supply chain – E-business Framework – case studies.

UNIT V

Managing global logistics and global supply chains: Logistics in a global economy – views of global logistics – global operation levels – interlink global economy- The global supply chains – Global supply chain business processes – Global strategy – Global purchasing – Global logistics – Channel in Global logistics – Global alliances – Issues and Challenges in Global supply chain Management – case studies.

REFERENCE BOOKS:

1 Dnald J. Bowersox and David JCloss. Logistical Management ; The Integrated Supply Chain
2 Process, TMH 2003.
3 Martin Christopher Logistics Supply Chain Management , Pitman London 1993.
4 Sunil Chopra and Peter Meindl: supply Chain Management : Strategy, Planning and Operation 2/e Pearson Education New Delhi 2002.
5 B. S Sahay supply chain Management for Global competitiveness Macmillan New Delhi 2003.
6 Phillp B. Schary Tage Skhott – Larsen : Managing the Global Supply Chain Viva Mumbai 2000.
7 Arjun J Van Weele: Purchasing and Supply Chain Management – Analysis , Planning and Practice 2/e Thomson Learning 2000.
8 Ballou, Business Logistics / Supply chain management 5/e Pearson Education

SUPPLY CHAIN MANAGEMENT

Model Paper

Time: 3 hours Max. Marks: 100

Answer any FIVE questions. All questions carry equal marks

1. What is competitive advantage? Can an organization gain competitive advantage through logistics? Explain with an example?
2. What is the concept of Total Cost Analysis? Explain the principles of logistics costing.
3. What is meant by supplier and distributor bench marking? How are benchmarking priorities set?
4. How important are sourcing decisions in supply chain? Explain the role of transportation in the supply chain?
5. What is Bull Whip Effect? Discuss with a suitable example, how it gets demonstrated in a supply chain?
6. What different dimensions a supply chain takes in a global economic setting? How are global supply chains different from domestic ones?
7. Discus in detail the role of IT in customer relationship management?
8. What is bench marking? State the criteria for setting bench marking priority?

Subject Code : (to be given by the department of Mechanical Engg.)

PRODUCTION AND OPERATIONS MANAGEMENT

SYLLABUS

UNIT -1

Operation Management – Definition – Objectives – Types of production systems – historical development of operations management – Current issues in operation management.

Product design – Requirements of good product design – product development – approaches – concepts in product development – standardization – simplification – Speed to market – Introduction to concurrent engineering.

UNIT II

Value engineering – objective – types of values – function & cost – product life cycle- steps in value engineering – methodology in value engineers – FAST Diagram – Matrix Method.

Location – Facility location and layout – Factors considerations in Plant location- Comparative Study of rural and urban sites – Methods of selection plant layout – objective of good layout – Principles – Types of layout – line balancing.

UNIT III

Aggregate Planning – definition – Different Strategies – Various models of Aggregate Planning – Transportation and graphical models.

Advance inventory control systems push systems – Material Requirement – Terminology – types of demands – inputs to MRP- techniques of MRP – Lot sizing methods – benefits and drawbacks of MRP – Manufacturing Resources Planning (MRP –II), Pull systems – Vs Push system – Just in time (JIT) philosophy Kanban System – Calculation of number of Kanbans Requirements for implementation JIT – JIT Production process – benefits of JIT.

UNIT IV

Scheduling – Policies – Types of scheduling – Forward and Backward Scheduling – Grant Charts – Flow shop Scheduling – n jobs and 2 machines, n jobs and 3 machines – job shop Scheduling – 2 jobs and n machines – Line of Balance.

UNIT V

Project Management – Programming Evaluation Review Techniques (PERT) – three times estimation – critical path – probability of completion of project – critical path method – crashing of simple nature.

REFERENCE BOOKS:

1 “Operations Management “ by E.S. Buffa

2 “Operations Management “Theory and Problems: by Joseph G. Monks.

3 “Production Systems Management “ by James I. Riggs.

4 “Production and Operations Management “ by Chary.

5 “Operations Management “ by Chase

6 “Production and Operation Management “ by Panner Selvam

7 “Production and Operation Analysis” by Nahima

PRODUCTION AND OPERATIONS MANAGEMENT
MODEL PAPER

Time: 3 hours Max. Marks: 100

Answer any FIVE questions. All questions carry equal marks

1. Briefly explain different tools for concurrent engineering.

2. There are two sites considered for locating a plant. The details are given below:

Items of Cost	Cost per Unit of Product at Various Stages	
	Site–1	Site–2
Quantitative Factors		
1. Raw materials and Other supplies	Rs. 2,50,000	Rs. 2,30,000
2. Fuel and Power	Rs. 70,000	Rs. 68,000
3. Water	Rs. 15,000	Rs. 17,000
4. Labour and Supervisor	Rs. 2,60,000	Rs. 2,25, 000
5. Land and Building	Rs. 22,00,000	Rs. 22,19,000
6. Distribution Expense	Rs. 2,50,000	Rs. 2,40,000
7. Freight Incoming	Rs. 2,10,000	Rs. 2,20,000
8. Taxes	Rs. 14,000	Rs. 12,000
Quantitative Factors		
1. Community Facilities	Good	Excellent
2. Housing Facilities	Very Good	Poor
3. Cost of Living	Normal	High
4. Community Attitude	Good	Encouraging

Find the desirable site for locating the plant.

3. Beta corporation has developed a forecast for a group of items that has the following demand pattern.

   (a) Plot the demand as a histogram. Determine the production rate required to meet average demand and plot the average demand forecast (Production rate) on the graph.

Quarter	Demand	Cumulative Demand
1	270	270
2	220	490
3	470	960
4	670	1630
5	450	2080
6	270	2350
7	200	2550
8	370	2920

(b) Plot the actual cumulative forecast requirements over time and compare them with the available average forecast requirements. Indicate the excess inventories and backorders on the graph.

4. (a) Explain the basic principles of JIT manufacturing system.

   (b) Highlight the principle involved in PUSH/PULL system. Also, the application areas of each system.

5. Consider the following 3 machines and 5 jobs flow shop problem.

Job	Processing time		
	$\frac{M}{c}-1$	$\frac{M}{c}-2$	$\frac{M}{c}-3$
1	7	4	3
2	9	5	8
3	5	1	7
4	6	2	5
5	10	3	4

Check whether Johnson's rule can be extended to this problem. If so, find the optimal schedule and the corresponding makespan.

6. Find the schedule using graphical method to minimize the time needed to process the following jobs on the machines shown (i.e for each machine, find the job which should be scheduled first), Also, calculate the total time elapsed to complete both jobs.

Job-1	Sequence	A	-	B	-	C	-	D	-	E
	Time (Hrs)	2		6		5		4		7
Job-2	Sequence	C	-	B	-	D	-	A	-	E
Time (Hrs)		6		5		7		4		8

7. Consider the following data of a project.

Activity	Predecessor (s)	Duration (weeks)		
		a	m	b
A	-	1	2	3
B	-	2	2	8

C	A	6	7	8
D	B	1	2	3
E	A	1	4	7
F	C,D	1	5	9
G	C,D,E	1	2	3
H	F	1	2	9

a) Construct the project network
b) Find the expected duration and variance of each activity
c) Find the critical path and the expected completion time
d) What is the probability of completing the project on or before 20 weeks ?.
e) If the probability of completing the project is 0.80, find the expected project completion time.

8. Consider the following data of a project.

Activity	Normal Time (weeks)	Normal Cost (Rs.)	Crash Time (weeks)	Crash Cost (Rs.)
1-2	7	600	4	840
1-3	11	200	9	First week: Rs 70 Second week: Rs 80
2-3	10	800	8	1000
2-4	6	500	4	760
2-5	16	100	9	380
3-4	6	200	4	360
3-5	9	500	4	960
4-5	8	300	5	500

If the indirect cost per week is Rs. 300, find the optimal crashed project completion time.

NANO SCIENCE AND TECHNOLOGY
SYLLABUS

Unit I

Introduction: Importance of Nano science &technology, Emergence of Nano-technology, Types of Nano materials, Bottom-up and Top-down approaches,, Applications of Nano Technology in Science and technology.

Unit II

Zero Dimensional Nano-structures: Nano particles through homogenous nucleation; Growth of nuclei, synthesis of metallic nano particles, Nano particles through heterogeneous nucleation; Fundamentals of heterogeneous nucleation and synthesis of nano particles using micro emulsions and Aerosol.

Unit III

One Dimensional Nano-structure, Nano wires and nano rods: Spontaneous growth: Evaporation and condensation growth, Casting method, vapor-liquid-solid growth, Electrochemical deposition and Electro spinning.

Unit IV

Two dimensional nano-structures: Fundamen tals of film growth. Physical vapour Depostion(PVD): Chemical Vapour Depostion (CVD) Characterization of nano materials by using spectroscopic and microscopic techniques-XRD,FTIR,DSC,SEM and TEM. Electrical measurements of nano composite materials by using fourprobe method.

Unit V

Introduction to Carbon Nano Tubes(CNTs), Properties, Preparation of CNTs-Laser ablation method, Arc method, chemical vapor deposition (CVD), Sol-Gel method, Carbon nanotube Polymer Nano composites ,Applications of Nano in drug delivery system.

Text books:

1.Introduction to Nano technologyby Charles P.Poole.Jr.& Frank J.ownes John wielly&sons Inc. Publishers -2006

2. Nano structures and Nano materials: Synthesis, properties and applications Guozhong Cao-Imperial College press.

Reference Book

:" Nano structured Materials" by Jackie Ying academic press, 2001

NANO SCIENCE AND TECHNOLOGY
MODEL QUESTION PAPER

Time:3hrs Max Marks:100
Answer any FIVE of the following Questions Each Question carries Equal Marks

1.a)What are nano materials? Explain different types of nano materials? 10M

b)Discuss the size effects on nano materials.

2. (a) List out few methods of Synthesis of nano part icles. 10M

(b) Explain how can you prepare the silver metal nano particles by using Physical Vapour Synthesis method with neat sketch? 10M

3. (a) Mention different methods used to produce carbon nano tubes. 10M

(b) Mention the properties and applications of carbon nano tubes 10M

4.What is meant by SEM? Explain the construction and working of SEM? Give its applications? 20M

5.Explain how you can Fabricate Nickel metal nano particles by using Chemical Vapour Deposition (CVD) method with neat sketch? 20M

6.Briefly explain about Bottom-up and Top-down app roaches. 10M Explain the synthesis of nano particles using aerosol method. 10M

7.How can characterize a nano composite material by using XRD ,DSC and SEM 20M

8.Briefly explain the following 20M

i) Nano wires and nano rods

ii)Physical vapo ur Deposition (PVD)

iii) Distinguish between SEM and TEM

iv) Applications of carbon Nanotubes in

engineering

SOLID STATE IONICS
SYLLABUS

UNIT 1:-Introduction.

Classification of solids –crystalline, amorphous materials and its processing techniques, structural characterization by IR, XRD, DSC/TGA and SEM methods

UNIT 2:-Ionic Materials

Introduction to polymeric materials –Blends, Composites and polymer electrolytes, Solid conducting polymer electrolytes –Fast ion conductors, Characterization. Solid conducting polymer electrolytes composites –Synthesis, processing and characterization and their device applications –Electrochemical cells, Rechargeable polymer battery, electro chromic devices, electro chemical solar cells, sensors.

UNIT 3:-Nano materials

Introduction to nano particles and nano composites, synthesis and processing technologies for nanostructure materials –Chemical co-precipitation method, soldzer method, hydrothermal method, co-polymerization method –Chemical oxidative polymerization method, structural, mechanical, optical and electrical studies of nano composites conductivity and electrical transport properties of processable nano materials –Applications.

UNIT 4:-Electrochemical cell Devices

Introduction to Electro chemical cells, sensors and fuel cells –Types–Synthesis and development of solid electrolyte membranes –Characterization by XRD, Differential scanning calorimetry (DSC), SEM(Scanning Electron Microscopy)

UNIT-V: Measurements:

Measurement ofelectrical conductivity of solid electrolyte membranes –Determination of transference number by Wagner's polarization method, water balance in membranes –Fabricationand working principlesof Electro chemical cell, fuel cell, sensors–Calculation of open circuit voltage (OCV), short circuit current, resistivity, current density, power density and estimation of efficiency, V-I characteristics of fuel cells, Application of fuel cells in transportation and low temperature electronic devices .

Prescribed Books:

1.Solid state Ionics for Batteries By M. Tatsumisago,M. Wakihara etc.,
Springer Publishers
2. Solid state Ionics by B.V.R. Chowdary,Wenji.B .World Scientifics Ltd.

SOLID STATE IONICS
MODEL QUESTION PAPER

Time:3hrs Max Marks:100

Answer any FIVE of the following Questions Each Question carries Equal Marks

1.(a) Explain briefly the different types of Solid Polymer Electrolytes. 10M

(b) Describe the working mechanism of a Polymer battery?.How can you estimate the efficiency of an Electrochemical cell? 10 M

2. (a) What is meant by Carbon Nano Tube? Give different Synthesizing Methods. 10 M

(b) How can you synthesize a Carbon Nano Tubes by using RF Plasma method 10M

3. (a) Define Transition Temperature and Melting Temperature of Polymeric Material. 10M

(b) Explain the Mechanical Properties of Polymers by stiffness, strength and toughness with neat diagrams.10M

4. (a) Discuss the Transport properties of Solid Electrolyte Membranes.10M

(b) How can you determine the Transferce Number of a given Solid Electrolyte Membrane by using Wagner's Polarization method. 10M

5. (a).What is meant by a Solid Polymer Nano composite? Mention its Characteristics.5M

(b) Discuss the Complexzation in Polymer Composites .How can you Study or Analyse the Complexation Mechanism by using different IR,XRD, Spectroscopic Techniques. 15M

6. (a).Define a Fuel Cell. Discuss different types of Fuel Cells. 10M

(b)What is PEM Fuel Cell? Explain the working of PEM Fuel Cell with neat Diagram. What is the role of Electrolyte in PEM Fuel Cell? 10M

7. a) Explain transport phenomenon in polymer electrolytes?20M

b)Determine transference number by using Wagner polarization method

c)Explain V-I characterstics of fuel cells

8. Write a brief note on the Following.4X5= 20M

(i)Structural Characterisation of a material by XRD

(ii)Electrochemical Solar Cells.

(iii)Synthesis Methods for Nano structured Materials

(iv)Fabrication of a PEM Fuel cell

Advanced Concrete Technology

UNIT I

Materials- Cement, Aggregates, mixing water soundness of aggregate- Fresh and hardened concrete: Admixtures- types of admixtures- purposes of using admixtures- chemical composition- effect of admixtures on fresh and hardened concretes- Natural admixtures.

UNIT II

Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT III

Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes.
Light weight concrete- Introduction- properties of light weight concrete- No fines concrete- design of light weight concrete.

UNIT IV

Flyash concrete- Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

UNIT V

High performance concretes- Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes.

Text Books:

Concrete technology- Neville & Brooks
Special Structural concrete- Rafat Siddique
Concrete repair and maintenance illustrated- Peter H Emmons
Concrete technology-M S Shetty

CONCRETE TECHNOLOGY

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

FRESH CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT – III

HARDENED CONCRETE : Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

MIX DESIGN : Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Low priced Edition – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi

PAVEMENT ENGINEERING
SYLLABUS

UNIT I
Categorization of test types, plate-loading tests, California bearing ratio test, modulus of rupture, indirect tensile test, resilient modulus test, complex(dynamic) modulus test, diametral resilient modulus, asphalt mix stiffness (shell nomograph), creep test, wave propagation techniques, poisson's ratio, fatigue testing.

UNIT II
Reasons for using admixture stabilization, cement stabilization, evaluation and criteria for suitability, cement stabilization, soil-lime, evaluation and criteria for suitability, lime stabilization, dilute emulsion stabilization, membranes, stabilization with calcium chloride and sodium chloride.

UNIT III
Compaction, strength-density-moisture consideration, choosing compacting moisture content,density,and depth of compaction, design units for sub grade design, estimating final moisture content, estimation of California bearing ratio, compaction control, purpose of base course, general properties of soil-aggregate mixtures, macadam base courses, cement-treated bases, asphalt-treated bases, equivalency coefficients, bases for concrete pavement, bases and sub bases for flexible pavements, untreated surfaces.

UNIT IV
Fundamental statistical concepts, the normal distribution, the distribution, measured variability of pavement systems, soil area variability, and statistical applications in pavement analysis, design and Evaluation.

UNIT V
Flexible pavements, rigid pavements, principles of maintenance, typical maintenance procedures, methods of structural evaluation, deflection measurements as an evaluation tool, interpretation of deflection data, conversion factors, overlay categories.

Text Books:
Pavement Design and Materials – A T Papagiannakis & E A Mazad
Highway Engineering – Khanna & Jhusto
Pavement Maintenance and Evaluation – Yuang Vuang
Traffic and Transporation Engineering – L R Kadiyali
Pavement Detoriation and Materials - Eudhor
Principles of Pavement Design, Yoder and Witczak, John Wiley and Sons

References:
Pavement Design and Materials, A T Papagiannakis & E A Mazad, John Wiley and Sons, 2007
Pavement Analysis and Design, Yang H. Huang, Pearson Prentice Hall, 2004
Pavement Engineering – Principles and Practice, Rajib B. Mallick and Tahar El-Korchi, CRC Press (Taylor and Francis Group)
Traffic Engineering and Transportation Planning by L.R.Kadiyali, Khanna Publishers