LS

CODE : 17EC11E2

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

LOW POWER VLSI DESIGN

(Digital Electronics and Communication Systems)

Time : 3 hours

Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 List the limitations of CMOS/BiCMOS technology and explain them in detail.

2 Explain the design considerations of p-well CMOS process and twin-well BiCMOS process.

SECTION – II

3 Describe about the sources of power dissipation in CMOS circuits with necessary mathematical expressions.

4 Consider a CMOS inverter circuit. The gate voltage V_G of a NMOS is increased from zero while, while the gate voltage of a PMOS is kept constant at 3V. For both transistors, magnitude of threshold voltage is 1 V and the product of transconductance parameter and (W/L) is 1 mA V^{-2}. Identify the region of operation for PMOS and NMOS when V_G is beyond 1 V. Estimate the output voltage V_O for $V_G = 1.5$ V.

SECTION – III

5 Explain about performance evolution of conventional CMOS and BiCMOS logic gates.

6 Draw the schematic diagrams of full voltage swing MBiCMOS logic gate and CC BiCMOS and explain them.

SECTION – IV

7 Draw the circuits for carry select adders and carry save adders and explain the operations in detail.

8 Discuss any two types of low voltage low power logic styles with an example of each.

SECTION – V

9 Explain about terms (i) Booth multiplier (ii) self-refresh technique in memories.

10 Explain the block diagram of DRAM architecture and its memory cells.

CODE : 17EC1105

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

TRANSFORM TECHNIQUES

(Digital Electronics and Communication Systems)

Time : 3 hours | Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

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SECTION – I

1 (a) Find the Fourier transform of rectangular function $x(t)=1$ *for* $|t|\le T$.
$=0$ *otherwise*

(b) Find the z-transform of the sequence $x(n)=\cos\left(\frac{\pi}{4}n\right)u(n)$

2 (a) Write a detailed note on Hilbert transform, properties and applications.

(b) Explain in detail the need for time-frequency analysis.

SECTION – II

3 (a) Define STFT of a signal and discuss on its short comings. Also explain Heisenburg uncertain principle.

(b) Show that the integer translates of the Shannon wavelet Ψ_s (t-k) form an orthonormal basis.

4 Show that if $\Psi(t)$ is a real-value wavelet then a function f(t) can be recovered from its CWT $W(a,b)asf(t)=\frac{1}{C}\int_{a=0}^{\infty}\int_{b=-\infty}^{\infty}\frac{1}{|a|^2}W(a,b)\Psi_{a,b}(t)da\,db$

Where $C=\int_0^{\infty}\frac{|\Psi(\omega)|^2}{\omega}d\omega$ Why can we not use this expression if the wavelet is complex?

SECTION – III

5 (a) Show that the upsampler and down sampler are time- variant systems.

(b) With an example obtain an experssion for spectrum of down sampled signal

6 Obtain DWT filter banks for Daubechies wavelet function.

SECTION – IV

7 Explain in detail lifting scheme of wavelet generation.

8 Write a detailed note on wavelet packets.

SECTION – V

9 Explain the application of wavelet in denoising a nosy signal

10 Write a detailed note on fractal signal systems.

CODE : 17EC1104

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

CODING THEORY & TECHNIQUES

(Digital Electronics and Communication Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 (a) Plot Binary entropy function and write its equation.

(b) Let X denote a random variable, and a, b denote arbitrary constants. If X is discrete, how are the entropies H (ax) and H(x+b) related to H(x).

2 (a) State and explain Lempel-Ziv algorithm with an example.

(b) Find the Lempel Ziv source code for the binary source sequence:
00010010000001 10000100000001000000101000010000001
10100000001100
Recover the original sequence back from the Lempel Ziv source code.
Hint: You require two passes of the binary sequence to decide on the size of the dictionary.

SECTION – II

3 Explain the following properties of Linear Block codes :
a) Generator and parity check matrices
b) Block error probability

4 The parity check matrix of a linear block code is given below:

$$H = \begin{bmatrix} 1\,1\,0\,1\,1\,0\,0\,0 \\ 1\,0\,1\,1\,0\,1\,0\,0 \\ 0\,1\,1\,1\,0\,0\,1\,0 \\ 1\,1\,1\,0\,0\,0\,0\,1 \end{bmatrix}$$

(a) Determine the generator matrix for this code in the systematic form.
(b) How many code words are in this code? What is the d_{min} for this code?

SECTION – III

5 Explain about block codes for error control in data storage systems with an example.

6 Determine the weight enumerator for the Hamming code of length 2^m.

SECTION – IV

7 Illustrate systematic cyclic codes with an example.

8 A convolutional code is described by

$g_1 = [101]$, $g_2 = [111]$, $g_3 = [1\ 1\ 1]$

a) Draw the encoder corresponding to this code.
b) Draw the state-transition diagram for this code.
c) Draw the trellis diagram for this code.

SECTION – V

9 (a) Illustrate Viterbi sequential decoding algorithm with necessary steps and diagrams.

(b) List and interpret the basic properties of Galois Fields.

10 Explain the decoding procedure of BCH codes with an example.

CODE : 17EC1103

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

EMBEDDED SYSTEM CONCEPTS

(Digital Electronics and Communication Systems)

Time : 3 hours

Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

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SECTION – I

1 (a) Discuss the classification of embedded systems.

(b) What is embedded system on chip? Explain the role of VLSI technology in embedded system on chip.

2 Explain the Design process of embedded systems.

SECTION – II

3 (a) Discuss the basic types of memory components used in embedded systems.

(b) Explain component interfacing in embedded systems.

4 Explain the following communication interfaces used in embedded systems.
i) RS232 ii) RS485 iii) IEEE488 bus

SECTION – III

5 With an example explain Round Robin with interrupts software architecture.

6 Explain the following.
i) Semaphores ii) Message queues

SECTION – IV

7 Explain linkers and locators for embedded software.

8 Discuss some advanced techniques for embedded software specification.

SECTION – V

9 Explain memory organization and data operations in ARM processor.

10 Explain the designing of
i) Telephone PBX ii) Ink jet printer.

Code: 17EC1102

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED DIGITAL SIGNAL PROCESSING

(Digital Electronics and Communication Systems)

Time: 3 Hours Max Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

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SECTION – I

1. (a) Briefly discuss
   (i) LTI discrete time system (ii) Energy Density Spectrum.
   (b) Explain the Discrete-Time Fourier Transform with neat sketches.

2. Sketch the signal x = sin(4*pi*[0:7]/8); and find the DFT of x. Do not use direct computation of the DFT.

SECTION – II

3. (a) Explain about Simple Digital Filters
   (b) Explain about System Identification.

4. (a) Discuss about Algebraic Stability Test.
   (b) Discuss about Inverse systems.

SECTION – III

5. (a) What is meant by Tunable IIR Digital Filters? Explain with suitable examples.
   (b) Explain in brief about FIR Cascaded Lattice Structures.

6. (a) Discuss in brief about Least Square Design Methods..
   (b) Discuss about Computational Complexity of Digital Filter Structures.

SECTION – IV

7. The 12-point DFT of a 12-point signal x(n) is given by
   X(k) = [0 0 1 0 0 0 0 0 0 0 0 1], k = 0, . . . , 11
   Give a formula for x(n) in terms of trigonometric functions.

8. Explain in detail
   (i) Sliding Discrete Fourier Transform (ii) Split Radix FFT

SECTION – V

9. Exlain in detail about Non-parametric methods.

10. Write short notes on
    (i) Tukey methods (ii) Yule-Waker & Burg Methods.
    (iii) MA & ARMA models.

CODE: 17EC1101

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. First Semester

DIGITAL SYSTEM DESIGN

(Digital Electronics and Communication Systems)

Time: 3 hours Max. Marks : 60

*Answer FIVE Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 What are the sequential circuit specification in ABEL and write a program and state diagram of the 0101-sequence detector?

2 Explain briefly about the design of a traffic light controller using ASM Charts.

SECTION – II

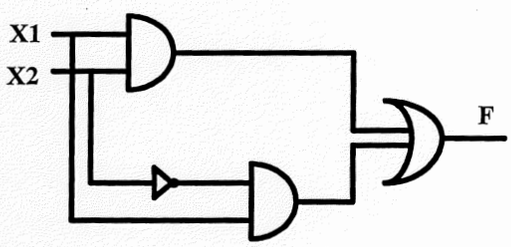
3 Classify the faults that occur in digital circuits and explain about bridging faults with an example.

4 Design an iterative circuit for n-bit comparator and explain the sequential circuit design using CPLD with an example.

SECTION – III

5 (a) Explain the basic principle of the Boolean difference.

(b) Consider the logic circuit shown below. Find the Boolean difference with respect to X_2.



6 Explain the 4-bit signature generator with a state diagram.

SECTION – IV

7 For each of the machines shown in the following table :

PS	NS,Z X=0	NS,Z X=1
A	D,0	C,0
B	C,0	D,0
C	A,0	B,0
D	D,1	A,1
E	C,0	D,0

M1

PS	NS,Z X=0	NS,Z X=1
A	B,0	A0,
B	B,1	C,1
C	A,1	D,0
D	C,0	A,1

M2

PS	NS,Z X=0	NS,Z X=1
A	C,0	D,1
B	C,0	A,1
C	A,1	B,0
D	B,0	C,1

M3

(a) Find the shortest homing sequences?

(b) Determine whether or not synchronizing sequences exist, and if any do exist, find the shortest ones?

8 (a) Show the testing table and graph for the machine given in table below.

PS	NS,Z X=0	NS,Z X=1
A	A,0	B,0
B	A,0	C,0
C	A,0	D,0
D	A,1	A,0

(b) Design a fault-detection experiment for the augmented machine.

SECTION – V

9 (a) Explain about different fault Models.

(b) List the problems of traditional test generation methods.

10 Explain about deterministic test generation and semi-random test generation

Code : 17CS11E3

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED OPERATING SYSTEMS

(Computer Science & Engineering)

Time : 3 hours

Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1. (a) In how many ways operating system is designed with separation of policies and mechanism? Explain each design approach in detail.

   (b) What are the problems with message passing communication model? How these problems are handled in Remote Procedure Call? Explain.

2 (a) Explain Client Server model.

   (b) Explain Bus-Based Multi processors.

SECTION - II

3 Explain scheduling in distributed systems.

4 Explain election algorithms and Dead locks in distributed systems.

SECTION - III

5 Explain in detail about Real-time distributed systems.

6 (a) Briefly explain about file system design in distributed systems.

   (b) Explain the concept of shared memory in Distributed systems.

SECTION - IV

7 Explain about page-based distributed shared memory concept.

8 Explain about consistency models in distributed shared memory.

SECTION - V

9 Explain the concept of process and memory management in MACH.

10 Explain Time Service and Security Service in DCE.

Code : 17CS1105

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

CRYPTOGRAPHY & NETWORK SECURITY

(Computer Science & Engineering)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 a) List and briefly explain categories of passive and active security attacks
b) Explain in detail the key generation in AES algorithm and its expansion format.

2 a) Mention the strengths and weakness of DES algorithm.
b) What is the difference between double DES and triple DES?

SECTION – II

3 a) What is the difference between a private key and a secret key?
b) In an RSA system, the public key of a given user is e=31,n=3599. What is the private key of this user?
c) In a public-key system using RSA, you intercept the cipher text C=10 sent to a user whose public key is e=5,n=35. What is the plaintext M?

4 a) Explain briefly about two general approaches used to attack a conventional encryption scheme.
b) Explain what is to be encrypted and where the encryption function is to be located to counter the attacks on confidentiality.

SECTION – III

5 a) What is the difference between a message authentication code and a one-way hash function?
b) What types of attacks are addressed by message authentication?
c) Compare the Features of SHA-1 and MD5 algorithm.

6 a) Proof that GCD(A,B) = GCD(B,R)
b) Solve the simultaneous congruence's $x \equiv 6 \pmod{11}$, $x \equiv 13 \pmod{16}$, $x \equiv 9 \pmod{21}$, $x \equiv 19 \pmod{25}$ using Chinese remainder theorem.
c) Find a primitive root modulo 11^2, 2 modulo 11^2, and modulo 11^{100}

SECTION – IV

7 a) Why has there been an interest in developing a message authentication code derived from a cryptographic hash function as opposed to one derived from a symmetric cipher?

b) Define digital Signature? Explain its role in network security.

8 a) Explain the components used by the PGP to provide authentication and confidentiality for E-Mail services and file transfer applications?

b) Explain How does a receiver finds the cryptographic algorithms in S/MIME message sent by the sender .

SECTION – V

9 a) What are the benefits of IPSec. Explain how selectors are used to filter outgoing traffic in order to map it into a particular SA.

b) List and briefly define the principal categories of SET participants.

10 a) Explain the protocol that is used to convey SSL related alerts to the peer entity.

b) What is the difference between rule-based anomaly detection and rule-based penetration identification?

Code: 17CS11E2

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

IMAGE PROCESSING

(Computer Science & Engineering)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

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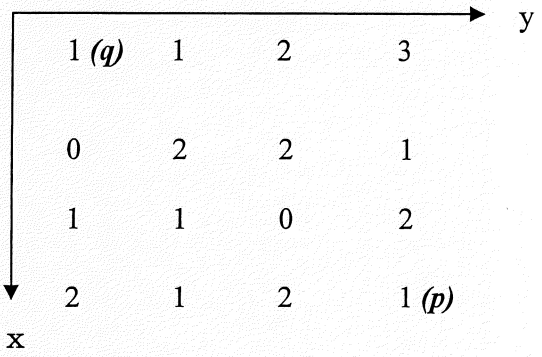
SECTION - I

1 Explain the fundamental steps in digital image processing with the help of a block diagram.

2 What is the advantage of m-connectivity over 4-connectivity? A 4×4 sub-image is shown below. Let V = {2, 4} and compute D_4, D_8 and D_m distances between ***p*** and ***q***.



SECTION - II

3 Explain the procedure for image enhancement which combines high frequency emphasis and histogram equalization to achieve edge sharpening and contrast enhancement.

4 (a) Explain various spatial domain filter approaches for image enhancement.

(b) Explain why median filter is not suitable for Gaussian noise. What is the limitation of median filter?

SECTION - III

5 (a) Differentiate between constrained and unconstrained restoration.

(b) Explain the minimum mean square error filtering or Wiener filtering.

6 (a) Illustrate the different causes of image degradation.

(b) Differentiate between Pseudo color image processing and Full color image processing. Explain HSI color model.

SECTION - IV

7 (a) Differentiate between lossless and lossy predictive coding.

(b) Explain the schematics of image compression standard, JPEG.

8 (a) Explain the concept of image morphology using opening and closing operations.

(b) Explain the concept of Hit-or-Miss Transformation with an example.

SECTION - V

9 (a) Explain in detail basic principle used in region growing by pixel aggregation with an illustrative example.

(b) Explain the region splitting and merging concepts used in image segmentation.

10 Explain in detail the significance of optimum statistical classifiers and neural networks.

Code : 17CS1104

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech I Semester

ADVANCED DATABASE MANAGEMENT SYSTEMS
(Computer Science & Engineering)

Time : 3 hours Max Marks: 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All questions carry equal marks

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SECTION - I

1 a) Explain various types of centralized and client / server architecture for DBMSs.
b) List and explain DBMS interfaces.

2 a) Explain about naming conventions and designing issues of ER model.
b) Write a note on subclasses, super classes and inheritance of EER model.

SECTION - II

3 a) Discuss multivalued dependencies and fourth normal form.
b) What are the various normal forms based on primary keys.

4 a) What are the various algorithms for SELECT and JOIN operations?
b) Explain selectivity and cost estimates in query optimization.

SECTION - III

5 a) Explain about object model of ODMG.
b) List and explain different types of class hierarchies and inheritances.

6 a) Describe SQL and its object relational features.
b) Explain object relational feature of Oracle 8.

SECTION - IV

7 a) Discuss mandatory access control and role based access control for multilevel security.
b) Explain about statistical database security.

8 a) Explain spatial and multimedia databases.
b) Briefly explain about deductive databases.

SECTION - V

9 a) Explain architecture and characteristics of mobile databases.
b) Briefly explain about GIS.

10 a) What are the various standards and operations of GIS?
b) Explain various characteristics of Genome Data Management.

Code : 17CS1103

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

OBJECT ORIENTED ANALYSIS AND DESIGN

(Computer Science and Engineering)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 Explain the macro processes that involved in the object-oriented S/W development life cycle.

2 (a) Explain the different categories of prototypes.

(b) What is an object? Discuss the basics of the object.

SECTION - II

3 (a) Describe the contents of design pattern.

(b) What are the different diagrams the Booch methodology consists? Explain any three of them in detail.

4 Explain the tow interaction diagrams for " issue of a book" and " renewal of a book" operations in a library.

SECTION - III

5 (a) Explain the steps in identifying associations.

(b) Explain the classification in object oriented analysis process.

6 (a) Explain the steps involved in the noun phrase classification approach.

(b) Explain use case model development.

SECTION - IV

7 (a) Explain the information Axiom with inheritance and without inheritance with suitable examples.

(b) Summarize the steps involved in the access layer design.

8 (a) Describe the Macro and Micro processes of View Layer design.

(b) Write short notes on object interoperability.

SECTION - V

9 (a) Discuss Myer's bug location and debugging principles.

(b) Explain Interface design rules.

10 (a) Describe Top-down and Bottom-up approaches. Which do you prefer and Why?

(b) Demonstrate boundary tests for quality assurance.

Code : 17CS1102

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED COMPUTER ARCHITECTURE

(Computer Science and Engineering)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 a Illustrate the effect of cache memory in the evaluation of performance of a computer system

b Explain the basic five stage instruction execution pipeline.

2 a What is Data Hazard and Control Hazard ? How these hazards will effect the performace of a computer system

b Explain the concept of virtual memory? How it effects the performance the system

SECTION – II

3 a Differentiate between inorder and out of order processors? Explain how register renaming would avoid dependencies.

b How Reservation stations are used to execute the instructions as per the program order? Explain

4 a Explain the design philosophy of a VIEW/EPIC processor

b Explain in detail the concept of Software pipelining

SECTION – III

5 Give the anatomy of a branch predictor? Differentiate between static and Dynamic prediction schemes?

6 What is a two level branch predictor? Explain

SECTION - IV

7 Explain how physical and virtual indexing will improve access to L1 Cache

8 a Explian the various techniques for memory hiding

b Illustrate with an example how to organize DRAM chips for improving memory bandwidth

SECTION – V

9 Explain the cache coherence problem? Give the different techniques to handle it

10 What is synchronization in multi processor systems? Explain how synchronization can be achieved in multiprocessor systems

Code : 17CS1101

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED DATA STRUCTURES AND ALGORITHMS

(Computer Science and Engineering)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) What is stack? Write algorithms for push and pop operations.

(b) Explain about Linked queues in detail.

2 (a) How does one measure the efficiency of an algorithm?

(b) Discuss about Best case complexity with example.

SECTION - II

3 (a) What is binary tree? Write the properties of binary tree.

(b) Construct a binary tree for the following inorder and preorder traversals.
Inorder : DBEAFC
Preorder: ABDECF

4 (a) What is Binary Search Tree? Explain about insertion operation with example.

(b) Discuss about AVL Tree with suitable example.

SECTION - III

5 (a) Define Splay tree and discuss the operations of splay tree.

(b) Discuss about Red-Black tree with its properties and example.

6 (a) Explain in detail about Hash Tables.

(b) Define Hash function and write the various applications of hash functions.

SECTION - IV

7 (a) Discuss in detail about Binary search.

(b) Explain Quick sort algorithm.

8 (a) Explain about Greedy method.

(b) Discuss about single source shortest path.

SECTION - V

9 (a) What is dynamic programming? Discuss about general method.

(b) Discuss about Travelling sales person's problem.

10 (a) Explain about 8-Queen's problem.

(b) Write short notes on control abstraction.

Code : 17MME101

M.TECH. DEGREE EXAMINATION, AUGUST 2021
M.Tech. I Semester

AUTOMATION IN MANUFACTURING
(Advanced Manufacturing Systems)

Time: 3hrs Max.Marks:60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1. a) Differentiate Between fixed, flexible and Programmable automation and mention their Relative advantages and applications.

   b) What is Degree of automation and how can it be made as unity?

2. a) Explain Automation strategies used in manufacturing.

   b) Discuss the manufacturing aspects plant capacity and production rate.

SECTION - II

3. What are the various material handling systems used in practice and explain about various conveyors used in assembly lines?

4. How the automated storage and retrieval system function in the effective of Material Handling?

SECTION - III

5. a) State the importance of line balancing. What are general strategies for this?

   b) How the optimum line balancing is done in Killbridge and Westers method?

6 Explain about manufacturing systems and components of a manufacturing systems.

SECTION - IV

7. Explain about the following :
   i) Group technology ii) cellular manufacturing

8. Discuss about Flexible Manufacturing systems and its components.

SECTION – V

9. a) Explain different manufacturing support systems.

   b) Explain computer aided process planning and concurrent engineering.

10.a) Explain the methods of shop floor control.

   b) Write inspection principles and strategies in quality control.

Code : 17MME102

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED MATERIAL TECHNOLOGY

(Advanced Manufacturing Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 Define the term Strengthening and explain in detail about solid solution strengthening and Grain boundary strengthening

2 Describe the Dislocation in FCC,BCC and HCP lattices with help of the neat sketches

SECTION - II

3 What is stress Intensity factory? Explain fracture toughness and Toughening Mechanisms in detail.

4 a) Discuss the use of Larsen-Miller parameter in the assessment of creep life.

b) Discuss the effects of metallurgical parameters on Creep.

SECTION - III

5 a) Explain the mechanism of crack propagations in details

b) What is High cycle fatigue test? Explain with an applications

6 What is Pari's Law and mention the effect of metallurgical variables on fatigue.

SECTION - IV

7 Discuss the favorable characteristics of materials for Aeronautical and Automobile Applications.

8 What are the factors considered in selection of selection of service requirements based on the design process

SECTION - V

9 Discuss the processing required for HSLA steel. Also mention their properties and applications.

10 Where do the Si_3N_4 and CBN ceramics find applications? What are their favorable characteristics also mention production and properties of Si_3N_4 and CBN.

Code : 17MME103

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED MANUFACTURING PROCESSES

(Advanced Manufacturing Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Differentiate between Abrasive jet micro machining and Abrasive water jet micro machining.

(b) Explain what the difficulties in traditional machining process in industry.

2 (a) Explain about mechanics of material removal process parameters with merits, demerits and applications.

(b) Describe the working principle of ultrasonic machining.

SECTION - II

3 (a) Explain the difference between Electro chemical machining and electrical discharge machining.

(b) Drive a theoretical relationship for the determination of the metal removal rate in ECM.

4 (a) Explain about Chemical machining and Electro chemical machining with its applications.

(b) Compare between EDM and wire cut EDM for its applications.

SECTION - III

5 Describe Laser Beam machining process with respect to its principle, applications and limitations.

6 (a) Explain clearly about Ion beam machining process with merits and demerits.

(b) Differentiate between plasma arc machining and electron beam machining.

SECTION - IV

7 (a) Discuss about Micro fabrication processes and Silicon Layer processes with their properties.

(b) Explain about the Carbon nanostructures with its applications.

8 (a) Explain about Micro system products and its applications and their characteristics?

(b) Discuss about Non Traditional processes in micro fabrication with some suitable examples.

SECTION - V

9 (a) Compare the advantages and disadvantages of MMC, CMC and reinforced plastics.

(b) List out the major types of ceramics that are useful in engineering applications.

10 (a) Explain different types of composites and its applications. And also explain about nano composites.

(b) Compare major differences between the properties of ceramics and those of metals and plastics.

CODE : 17MME104

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

DESIGN FOR MANUFACTURING AND ASSEMBLY

(Advanced Manufacturing Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 (a) Explain about the general design rules for manufacturability.

(b) What are the basic principles in design for economical production? Discuss

2 Inter relate the design process with material selection and process selection.

SECTION – II

3 Derive the expression of optimum cutting speed for minimum cost in turning.

4 Explain the general design considerations for casting.

SECTION – III

5 What are the factors considered in design of weldments ? Discuss.

6 (a) Explain the general design considerations for closed die forging.

(b) Explain the effect of thermal stresses on weld joints.

SECTION – IV

7 (a) Explain the choice of assembly method.

(b) Discuss on intermittent transfer system in automatic assembly. What are the advantages and disadvantages?

8 Write a short notes on i) transfer machine ii) Assembly process.

SECTION – V

9 (a) How the general design guidelines are useful for manual assembly?

(b) Explain the effect of part symmetry on handling time.

10 (a) Write notes on classification system for manual insertion and fastening.

(b) Explain the systematic DFA analysis method with an example.

code : 17MME1E4

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ADVANCED CASTING AND WELDING TECHNIQUES

(Advanced Manufacturing Systems)

Time : 3 hours Max. Marks :60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION - I

1 (a) Explain with suitable sketch the difference between solidification of a pure metal and an alloy during casting process

(b) List out any four desirable properties of a moulding sand

2 (a) What is directional solidification. Explain with suitable sketch

(b) What is degasification of melt in the casting process.

SECTION - II

3 (a) Explain the Shell moulding process with neat sketches. Enumerate its advantages and disadvantages.

(b) What are the important properties that a die should possess in Die casting

4 (a) Explain the CO_2 moulding process with neat sketches. List out its advantages and disadvantages

(b) Explain continuous casting with neat sketch

SECTION - III

5 (a) What are the various welding defects. Explain the parameters which can control and minimize these defects

(b) Explain the role of NDT in the testing of welded joints

6 (a) Discuss briefly about residual stresses in the welded joints.

(b) Explain the procedure for design of welded joints

SECTION – IV

7 (a) Explain the Explosive welding process with neat sketch. Write down its applications and limitations.

(b) Explain Diffusion bonding with neat sketch

8 (a) Explain the Electron Beam Welding process with neat sketch. Give its applications

(b) Explain Ultrasonic welding with neat sketch

SECTION - V

9 (a) Explain with a flow chart the various steps involved in computer aided manufacturing of a casting

(b) What sand reclamation? Write about the sand reclamation in casting industry

10. (a) Explain any four material handling equipment in Foundry with neat sketch

(b) Explain the advantages of using robots in welding in Nuclear and Aerospace industry

Code : 17MME105

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

OPTIMIZATION TECHNIQUES IN ENGINEERING

(Advanced Manufacturing Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 a) Write the general statement of an Optimization problem. Write some Engineering applications of optimization.

b) The daily demand for loaves of a bread at a grocery store are specified by the following probability distribution:

n	100	150	200	250	300
p_n	0.20	0.25	0.30	0.15	0.10

The store pays Rs.5.5 a loaf and sells it for Rs.12 each. Any loaves that are not sold by the end of the day are disposed of at Rs.2.5 each. Assume that the stock level is restricted to one of the demand levels specified for p_n.

Develop the assumed decision tree and find the number of loaves to be stocked daily.

2 What are the different criteria to handle a decision problem under uncertainty? Explain them with an example.

SECTION – II

3 Solve by revised Simplex method:

Minimize: $Z = 3x_1 + 2x_2$

Subject to : $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + x_2 \leq 3$

and $x_1, x_2 \geq 0$

4 Solve by Dual Simplex method:

Minimize: $Z = 3x_1 + 2x_2$

Subject to : $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + x_2 \leq 3$

and $x_1, x_2 \geq 0$

SECTION – III

5 Use the Kuhn-Tucker conditions to solve the following non-linear programming problem:

Maximize: $Z = (x_1 - 1)^2 + (x_2 - 5)^2$

Subject to: $-x_1^2 + x_2 \leq 4$

$-(x_1 - 2)^2 + x_2 \leq 3$

6 Apply Wolfe's method for solving the quadratic programming problem

Maximize: $Z = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

Subject to: $x_1 + 2x_2 \leq 2$

and $x_1, x_2 \geq 0$

SECTION – IV

7 Solve the following MIP by Gomory's method

Maximize $Z = 3x_1 + 4x_2$

Subject to: $3x_1 - x_2 \leq 12$

$3x_1 + 11x_2 \leq 66$

$x_1 \geq 0$

$x_2 \geq 0$ and integer.

8 Solve the following binary integer programming problem using exhaustive enumerative method:

Maximize $f = -10x_1 - 5x_2 - 3x_3$

Subject to: $x_1 + 2x_2 + x_3 \geq 4$

$2x_1 + x_2 + x_3 \leq 6$

$x_i = 0$ or 1, $i = 1,2,3$.

SECTION – V

9 Consider the data of a flow network as shown below:

(a) Draw the flow network

(b) Determine the maximum flow from node 1 to node 6 and also the corresponding flow pattern using the matrix method.

Arc i-j	Flow		Arc i-j	Flow	
	f_{ij}	f_{ji}		f_{ij}	f_{ji}
1-2	60	10	3-4	35	----
1-3	35	25	3-5	30	28
2-3	25	20	4-5	45	----
2-4	19	24	4-6	40	----
2-5	25	30	5-6	55	----

10 Use Dynamic Programming approach to solve the following LPP:

Maximize $Z = 8x_1 + 7x_2$

Subject to: $2x_1 + x_2 \leq 8$

$5x_1 + 2x_2 \leq 15$

and $x_1, x_2 \geq 0$

Code : 17PS11E1

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

ELECTRICAL DISTRIBUTION SYSTEMS

(Power Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 (a) Explain different types of loads with their characteristics.
(b) Explain the terms: connected load, load factor, demand factor and diversity factor with examples.

2 (a) What is meant by the term load? How loads can be classified? How is load modeling done in distribution networks?
(b) What is distribution system? Explain the elements of distribution system.

SECTION – II

3 (a) How do you fix the rating of a distribution substation? Explain.
(b) Explain a methodology for optimal location of substation.

4 (a) What is meant by primary feeder loading? Discuss the factors affecting the loading in terms of design and decisions for feeder routing.
(b) Mention various factors that are to be considered in selecting ideal substations.

SECTION – III

5 (a) Derive the voltage drop and power loss expressions of a feeder with a uniformly distributed load.
(b) Explain the difference between a 3-phase balanced and non 3-phase primary line.

6 (a) Derive the expressions for volt drop and power loss in lines.
(b) Determine the ratio between power loss for a single phase 2 wire ungrounded and three phase systems.

SECTION – IV

7 (a) Explain the fault current calculations in the distribution system for any one type of fault with an example.
(b) Describe the principle of operation of line sectionalizers.

8 (a) Explain briefly about the common type of faults that occur in the distribution system.
(b) Discuss the need of coordination of protective devices with an example.

SECTION – V

9 (a) Describe different types of equipment for voltage control with neat diagrams.
(b) With the aid of schematic diagram and phasor diagram explain line drop compensation of induction voltage regulator

10 (a) Explain the method of voltage control by series capacitors and mention its advantages.
(b) What is a line drop compensator? How is it used along with tap changer of transformer for voltage control?

Code: 17PS1104

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

POWER QUALITY
(Power Systems)

Time : 3 hours

Max. Marks : 60

*Answer FIVE Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 Explain the overview of Power Quality Phenomenon and classification of Power Quality Phenomenon in detail.

2 Explain any three Reliability evaluation techniques.

SECTION – II

3 a) Explain the origin of Interruptions?
b) Explain the monitoring of short Interruptions?

4 a) Describe about the input data for prediction of short interruptions?
b) What are the assumptions for prediction of short interruption

SECTION – III

5 Explain how to estimate the Phase Angle Sump and Phase Angle Jump for three – phase unbalanced sags?

6 Explain about the sags due to starting of induction motors.

SECTION – IV

7 Write about the behavior of sensitive load due to voltage sag

8 Explain the effect of voltage sag on computer and other electronic equipment

SECTION – V

9 Explain voltage sag coordination chart for presentation of results.

10 Explain the procedure of power quality monitoring

Code : 17PS1103

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

POWER SYSTEM OPERATION & CONTROL

(Power Systems)

Time : 3 hours Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

1 (a) Explain the modeling of single area load frequency control problem.

(b) Two areas are connected via an inter tie line. The load at 50 Hz is 15000MW in area 1 and 35000 MW in area 2. Area 1 is importing 1500 MW from area 2. The load damping constant in each area is B=1.0 and regulation R=6% for all units. Area 1 has a spinning reserve of 800 MW spread over 4000 MW of generation capacity and area 2 has spinning reserve of 1000 MW generation. Determine the steady state frequency generation and load of each area and tie line power for

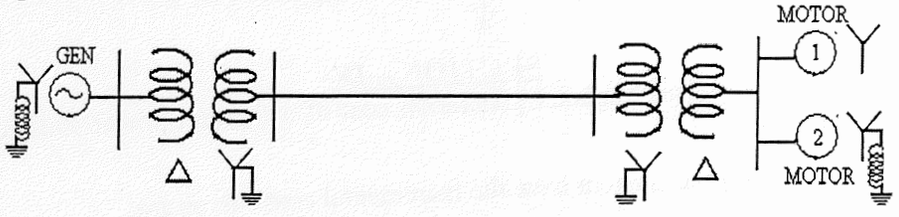
a) Loss of 1000 MW in area 2 with no supplementary control.
b) Loss of 1000 MW in area 2 with supplementary controls provided on generators with reserve.

2 (a) Give a typical block diagram for a two-area system inter connected by a tie line and explain each block.

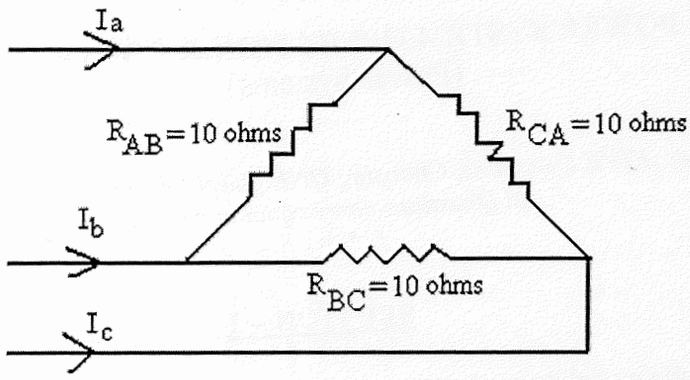
(b) What are the features of the dynamic response of a two area system for step load disturbances.

SECTION – II

3 (a) A 25 MVA ,11 KV, Three phase generator has a sub transient reactance of 25%. The generator supplies two motors over a transmission line with transformers at both ends as shown in one line diagram of the following fig the motors has rated inputs of 15 and 7.5 MVA , both 10 KV with 30% sub transient reactance the three phase transformers are both rated 30MVA,10.8/121 KV, connection Δ-Y with leakage reactance of 15% each .the series reactance of line is 150 ohms. Draw the positive and negative sequence networks of the system assume negative sequence reactance is equal to its sub transient reactance



(b) A balanced 200V, 3 phase supply feeds balanced resistive load as shown in figure if the resistance R_{BC} is disconnected .determine I_a, I_b and I_c and symmetrical components of I_a, I_b and I_c.



4 (a) Derive the equation for fault current and line to ground voltages during single line to ground fault using symmetrical components

(b) Two 11KV, 20 MVA, three phase star connected generator s operate in parallel as shown in fig , the positive, negative and zero sequence reactance's of each being respectively , j0.18, j0.15, j0.10 pu. The star point of one of the generators is isolated and that of the other is earthed through 2.0 ohm resistor. A single line to ground fault occurs at the terminals of one of the generators Estimate
i) The fault current
ii) Current in grounding resistor and
iii) The voltage across grounding resistor

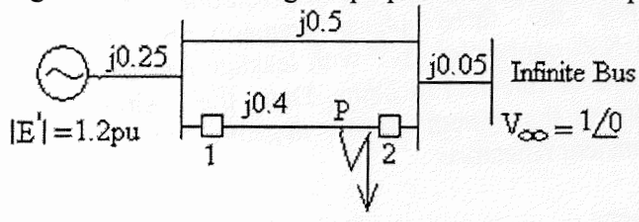
SECTION – III

5 (a) What are the assumptions made in deriving swing equation and derive swing equation.

(b) Explain methods of improving transient stability.

6 (a) Explain equal area criterian for improving dynamic stability.

(b) A three phase fault is occurred at point Pas shown in fig find the critical clearing angle for clearing the fault with simultaneous opening of the breakers 1 and 2 .The generator is delivering 1.0 pu power at the instant preceding the fault



SECTION – IV

7 (a) Explain how the incremental generation cost of a thermal power station can be determined.

(b) A simple two plant system have the incremental cost curves are

$$\frac{dC_1}{dP} = 0.01P_{G1} + 2.0 \quad ; \quad \frac{dC_2}{dP} = 0.01P_{G2} + 1.5 .$$

8 (a) Draw the flow chart for obtaining optimal scheduling of generating units by neglecting the transmission losses.

(b) The incremental costs in Rs/MW.Hr for two units in a plant are given by,

$$\frac{df_1}{dp_1} = 1.0p_1 + 200; \quad \frac{df_2}{dp_2} = 1.2p_2 + 160$$

The minimum and maximum generation on each unit are to be 20 MW and 125 MW respectively. Determine the economic allocation between the units for a total load of 200 MW.

SECTION - V

9 (a) A power system consists of two 100MW units whose input cost data are represented by equations below :

$C_1 = 0.04\ P_1^2 + 22P_1 + 800$ Rupees/hour

$C_2 = 0.045\ P_2^2 + 15P_2 + 1000$ Rupees/hour

If total received power P_R=150Mw.Determine the load sharing between units for most economic operation.

(b) What is incremental transmission loss and derive general transmission loss formula?

10 (a) Explain the problem of short term Hydro-thermal scheduling.

(b) Derive the co-ordination equation for the optimal scheduling of Hydro – Thermal interconnected power systems.

Code : 17PS1102

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

HVDC& FACTS
(Power Systems)

Time : 3 hours | Max. Marks : 60

*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks
* * *

SECTION - I

1 a) Comparison of AC and DC Transmission in detail.

b) Explain Modern trends in DC Transmission.

2 a) Draw the schematic circuit diagram of a 6 pulse gratez's circuit and explain its principle of operation.

b) Explain the individual characteristics of rectifier and inverter operation with neat sketch.

SECTION - II

3 a) For a fixed power transmission explain how the economic choice of voltage level selected in dc transmission system.

b) Explain the analysis of two and three valve conduction mode.

4 Discuss the principals of DC link control and give the basic and modified converter control characteristics.

SECTION – III

5 a) Explain how the harmonics are generated.

b) Draw the current controlled characteristics of Tyrister controlled reactor.

6 Discuss the various types of AC Filters and their protection.

SECTION – IV

7 Classify the different types of FACTS controllers and explain the relative importance of different types of controllers.

8 List the objectives of shunt compensation and compare STATCOM with SVC?.

SECTION - V

9 Discuss the following
i) GCSC ii) TSSC iii) SSSC

10 Write the comparison between Unified power flow controller and Interline power flow controller.

Code : 17PS1101

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

COMPUTER METHODS IN POWER SYSTEMS
(Power Systems)

Time : 3 hours | Max. Marks : 60

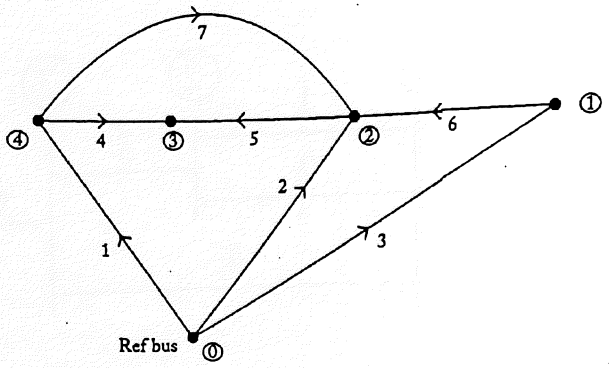
*Answer **FIVE** Questions, Choosing **ONE** Question from each section*
All Questions carry equal marks

* * *

SECTION – I

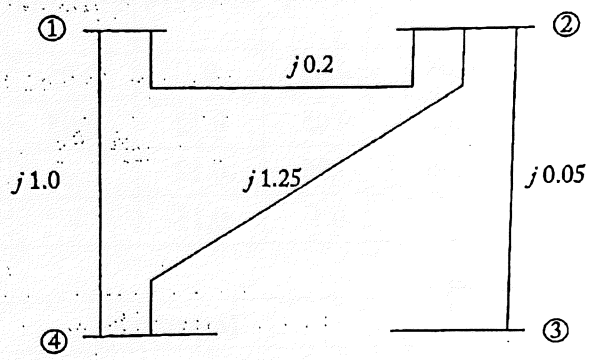
1 Derive the expressions for bus admittance and impedance matrices by singular transformation.

2 For the oriented graph shown in figure below, obtain the bus incidence matrix, branch-path incidence matrix and the basic cut-set matrix.



SECTION – II

3 Obtain the bus impedance matrix by the step-by-step method for the network shown in figure below. Take bus-4 as the reference bus. Line impedances are given in p.u.



4 (a) Describe the algorithm for formation of bus impedance matrix for addition of a link.

(b) What are the advantages of Z_{bus} building algorithm?

SECTION – III

5 Derive the necessary expressions for building up algorithm of a three phase Z_{bus} when the added element is a branch.

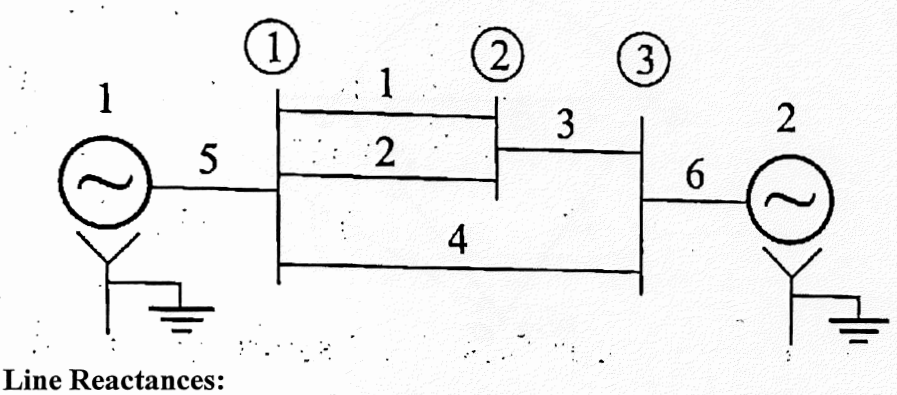
6 Find Z_{pq}^{012} given:

$$Z_{pq}^{abc} = \begin{bmatrix} j0.4 & j.1 & j0.1 \\ j0.2 & j0.6 & j0.2 \\ j0.3 & j0.3 & j0.8 \end{bmatrix}$$

SECTION – IV

7 Derive the equations for the total fault current in terms of symmetrical components and phase quantities for the following faults at bus-p for a general system:(a) line-to-line and (b) three phase (un-grounded).

8 Using symmetrical components, calculate the following for a three-phase to ground fault at bus-3: (i) fault currents (ii) line currents and (iii) bus voltages during fault. Assume $V^a{}_o$=1+j0.



Line Reactances:

Bus code	Self Impedance			Mutual Impedance	
	+ve seq.	-ve seq.	Zero seq	Zero seq	Coupling element
1-2(1)	0.05	0.05	0.1	0.05	1-2(2)
1-2(2)	0.05	0.05	0.12	0.05	1-2(1)
2-3	0.06	0.06	0.12	-	-
1-3	0.1	0.1	0.15	-	-

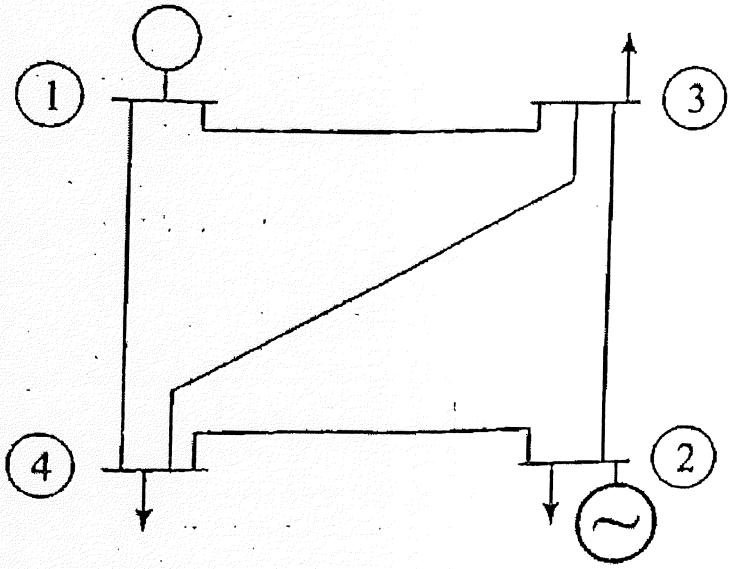
Generator Reactances :

Generator	Impedance		
	+ve seq.	-ve seq.	Zero seq
1	0.25	0.15	0.04
2	0.20	0.12	0.02

SECTION – V

9 Explain sparsity and its application in power flow studies.

10 The four bus system shown in figure below has the line and load/generator data shown below. All line charging is neglected. Take bus MVA=100 and carry out one iteration using the FDLF method.



Line Data(p.u)	
Bus code	**Impedance**
1-3	j0.05
1-4	j0.05
2-3	j0.05
3-4	j0.10

Load/Generator Data				
Bus	**Gen.**		**Load**	
	MW	**MVAR**	**MW**	**MVAR**
1	0	0	0	0
2	100	50	50	25
3	0	0	75	30
4	0	0	100	50

Code : 17SH1101

M.TECH. DEGREE EXAMINATION, AUGUST 2021

M.Tech. I Semester

PROBABILITY, STATISTICS AND COMPUTATIONAL TECHNIQUES
(POWER SYSTEMS)

Time : 3 hrs Max Marks : 60

Answer Five Questions, Choosing ONE Question From each section
All Questions carry equal marks

SECTION – I

1 (a) Give that $f(x)=\frac{K}{2x}$, is a probability distribution for a random variable X that can take on the values $x=1,2,3$ and 4.
(i) Find K (ii) Mean and variance of X.

(b) If X is a Poisson Variate such that $3p(x=4)=\frac{1}{2}p(x=2)+p(x=0)$ find (i) the mean of x (ii) $p(x\le 2)$

2 (a) A continuous random variable has the probability density function $f(x)=\begin{cases} k\,x\,e^{-\lambda x}, & for\ x\ge 0,\ \lambda>0 \\ 0, & otherwise \end{cases}$. Determine (i) k (ii) Mean (iii) Variance.

(b) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.

SECTION – II

3 (a) The mean and standard deviation of a population are 11,795 and 14054 respectively. If $n=50$, find 95% confidence interval for the mean.

(b) The research investigator is interested in studying whether there is a significant difference in the salaries of M.Tech graduates in two metropolitan cities. A random sample of size 100 from Mumbai yields on average income of Rs. 20,150. Another random sample of 60 from Chennai results in an average income of Rs. 20,250. If the variance of both the populations are given as $\sigma_1^2 = Rs.40,000$ and $\sigma_2^2 = Rs.32,400$ respectively.

4 (a) Among 900 people in a state 90 are found to be chapatti eaters. Construct 99% confidence interval for the true proportion.

(b) A pair of dice are thrown 360 times and the frequency of each sum is indicated below:

2	3	4	5	6	7	8	9	10	11	12
8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the chi-square test at 0.05 level of significance?

(P.T.O)

SECTION – III

5 (a) Find a real root of $xe^x = 2$ using Regula falsi method.

(b) From the following table, estimate the number of students who obtained marks between 40 and 45:

Marks	30-40	40-50	50-60	60-70	70-80
Number of students	31	42	51	35	31

6 (a) Using Lagrange's interpolation formula, find the value of $y(10)$ from the following table:

x	5	6	9	11
y	12	13	14	16

(b) Given that

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1.1$

SECTION – IV

7 (a) Fit a second degree parabola to the following data:

x	1.0	1.5	2	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(b) An experiment gave the following values:

$v(ft/\min)$	350	400	500	600
$t(\min)$	61	26	7	26

It is known that v and t are connected by the relation $v = at^b$. Find the best possible values of a and b

8 A rocket is launched from the ground. Its acceleration measure every 5 seconds is tabulated below. Find the velocity and the position of the rocket at $t = 40$ seconds. Use trapezoidal rule as well as Simpson's rule.

t	0	5	10	15	20	25	30	35	40
$a(t)$	40.00	45.25	48.50	51.25	54.35	59.48	61.5	64.3	68.7

SECTION – V

9 (a) Find the value of y at $x = 0.1$ by Picard's method, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$

(b) Solve numerically $y' = y + e^x$, $y(0) = 0$, $h = 0.2$ for $x = 0.2$ by modified Euler's method.

10 Using R-K fourth order method, find y for $x = 0.1, 0.2, 0.3$ given that $y' = xy + y^2$, $y(0) = 1$. Find $y(0.4)$ by Milne's method.