

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

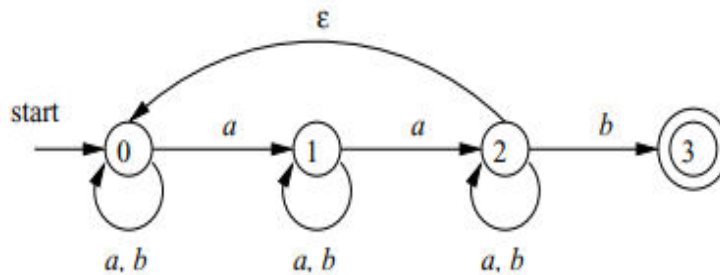
All Questions Carry Equal Marks

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**UNIT-I**

Marks	CO	Blooms Level
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1. a Describe the main phases of a compiler?  
Describe each phase briefly.
- b Define a Nondeterministic Finite Automaton (NFA) and explain its components in detail.  
Give the transition table for the NFA of graph:

**(OR)**

2. a Describe the role of lexical analysis in compiler design.
- b Write a Lex program that copies a file, replacing each non-empty sequence of white space by a single blank.

**UNIT-II**

3. a How do context-free grammar (CFG) derivations work, and how can ambiguity arise in a CFG? Explain with example.
- b Discuss about Left factoring and Left Recursion with an example?

**(OR)**

4. a Construct Predictive Parse Table for the grammar  
 $E \rightarrow E+T | T$   
 $T \rightarrow T * F | F$   
 $F \rightarrow (E) | id$  and parse the string  $id+id*id$ .
- b Write Rules to construct FIRST Function and FOLLOW Function.

### UNIT-III

5. a What are the common conflicts that can be encountered in shift reduce parsers? Explain. 5 CO3 K2  
b What is Dangling ELSE ambiguity? How to reduce it 5 CO3 K3

(OR)

6. a Construct CLR parser for the grammar  $S \rightarrow L=R, S \rightarrow R, L \rightarrow *R, R \rightarrow L$ . 10 CO3 K3

### UNIT-IV

7. a Draw syntax tree for the arithmetic expression  $a * b + c - d$ . Write the given expression in postfix notation. 10 CO4 K3

(OR)

8. a What is an Abstract syntax tree? How to construct it? Explain by writing syntax directed definition 10 CO4 K3

### UNIT-V

9. a Explain in brief about Stack Storage allocation strategy. 5 CO5 K2  
b Explain Lazy-code motion problem with an algorithm 5 CO5 K3

(OR)

10. a Explain the following peephole optimization techniques: 5 CO5 K3  
a) Elimination of Redundant Code  
b) Elimination of Unreachable Code  
b Discuss is the run-time environment? And demonstrate its requirement? 5 CO5 K3

### UNIT-VI

11. a Explain the graph coloring algorithm for register allocation. 5 CO6 K2  
b What are the challenges in handling variable-length instructions in code generation? 5 CO6 K3

(OR)

12. a Discuss how does linking and loading affect object code generation? 5 CO6 K3  
b Explain the trade-offs between code quality and compilation speed in a code generator. 5 CO6 K3

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<u>UNIT-I</u>		Marks	CO	Blooms Level
1.	a Explain the theta notation used in algorithm analysis.	5	1	K2
	b What is space complexity? Illustrate with an example for fixed and variable part in space complexity.	5	1	K2
(OR)				
2.	a What do you mean by performance analysis? Derive the run time complexity of a non-recursive Fibonacci series algorithm using tabular method	5	1	K2
	b What is an algorithm? Explain its characteristics in detail	5	1	K2
<u>UNIT-II</u>				
3.	a Sort the records with the following index values in the ascending order using quick sort algorithm. 2, 3, 8, 5, 4, 7, 6, 9, 1	5	2	K2
	b With a suitable algorithm, explain the problem of finding the maximum and minimum items in a set of n elements	5	2	K2
(OR)				
4.	a Describe binary search in detail and provide time complexity analysis with an example	5	2	K2
	b Construct the various tracing steps of merge sort and analyse the time complexity for the following data: 33, 44, 2, 10, 25, 79, 86, 47, 14, 36	5	2	K2
<u>UNIT-III</u>				
5.	Use the greedy algorithm for sequencing unit time jobs with deadlines and profits to generate the solution when $n=7$ , $(p_1, p_2, \dots, p_7)=(3, 5, 20, 18, 1, 6, 30)$ , and $(d_1, d_2, \dots, d_7)=(1, 3, 4, 3, 2, 1, 2)$ .	10	3	K3

**(OR)**

- |    |   |   |   |   |    |
|----|---|---|---|---|----|
| 6. | a | Explain the general principle of Greedy method and also list the applications of Greedy method. | 5 | 3 | K2 |
|    | b | Briefly explain prim's algorithm with an example  | 5 | 3 | K2 |

**UNIT-IV**

- |    |  |  |    |   |    |
|----|--|--|----|---|----|
| 7. |  | State the Job– Sequencing with deadlines problem. Find an optimal sequence to the n= 5 Jobs where profits (P1, P2, P3, P4, P5) = (20, 15, 10, 5, 1) and deadlines (d1, d2, d3, d4, d5) =(2, 2, 1, 3, 3). | 10 | 4 | K3 |
|----|--|--|----|---|----|

**(OR)**

- |    |   |  |   |   |    |
|----|---|--|---|---|----|
| 8. | a | Write an algorithm for 0/1 Knapsack problem using Dynamic programming.   | 5 | 4 | K2 |
|    | b | Draw an Optimal Binary Search Tree for n=4 identifiers (a1,a2,a3,a4) = ( do, if, read, while) P(1:4)=(3,3,1,1) and Q(0:4)=(2,3,1,1,1). | 5 | 4 | K3 |

**UNIT-V**

- |    |   |   |   |   |    |
|----|---|---|---|---|----|
| 9. | a | What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm? | 5 | 5 | K2 |
|    | b | Explain control abstraction of LC-branch and bound?   | 5 | 5 | K2 |

**(OR)**

- |     |  |  |    |   |    |
|-----|--|--|----|---|----|
| 10. |  | Give the statement of sum –of subsets problem. Find all sum of subsets for n=4, (w1, w2, w3, w4) = (11, 13, 24, 7) and M=31. Draw the portion of the state space tree using fixed – tuple sized approach | 10 | 5 | K3 |
|-----|--|--|----|---|----|

**UNIT-VI**

- |     |   |   |   |   |    |
|-----|---|---|---|---|----|
| 11. | a | Compare NP Hard and NP complete               | 5 | 6 | K2 |
|     | b | Explain the non-deterministic Sorting Problem | 5 | 6 | K2 |

**(OR)**

- |     |  |                                 |    |   |    |
|-----|--|---------------------------------|----|---|----|
| 12. |  | State and prove Cook's theorem. | 10 | 6 | K2 |
|-----|--|---------------------------------|----|---|----|

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	<b><u>UNIT-I</u></b>	Marks	CO	Blooms Level
1.	Design a connection to join two plates of size 250 x 10mm of grade Fe 410 to mobilize full plate tensile strength using shop fillet welds, if (i) a lap joint is used, (ii) a double cover butt joint is used.	10	1	4
	<b>(OR)</b>			
2.	Two plates 200 x 8mm of grade 410 are connected by bolts of diameter 20mm of grade 4.6 using butt joint. Design the bolted connection to transmit a pull equal to the strength of the plate. Also sketch the arrangement of bolts in the joint.	10	1	3
	<b><u>UNIT-II</u></b>			
3.	ISMB 550 @1.037 kN/ m has been used as simply supported over a span of 4m. The ends of beam are restrained against torsion but not against lateral bending. Evaluate the safe UDL per metre, which the beam can carry.	10	2	3
	<b>(OR)</b>			
4.	A simply supported beam(laterally supported) of span 12m carries a UDL of 40kN/m. In addition to UDL the beam is carrying a central point load of 50kN. Design the section and check the section for shear and deflection.	10	2	3
	<b><u>UNIT-III</u></b>			
5.	Write about The different modes of failure in tension members.	10	3	2
	<b>(OR)</b>			
6.	Design a tension member to carry load of 1000kN. Two angles placed back to back with long leg outstanding are desirable. The length of the member is 4m.	10	3	4

### **UNIT-IV**

7. Design a laced column with two channels back to back of length 10m to carry an axial factored load of 1200 kN. The column may be assumed to have restrained in position but not in direction at both ends
- |    |   |   |
|----|---|---|
| 10 | 4 | 4 |
|----|---|---|

**(OR)**

8. Design a laced column with two channels back to back of length 12m to carry an axial factored load of 2000 kN. The column may be assumed to have restrained in position but not in direction at both ends.
- |    |   |   |
|----|---|---|
| 10 | 4 | 4 |
|----|---|---|

### **UNIT-V**

9. A hand operated 50 kN overhead crane is provided in a workshop. The details are given below: Centre to centre between gantry girders = 16 m, Span of the gantry girder = 6 m, Weight of the crane = 40 kN, Wheel spacing = 3 m, Weight of the crab = 10 kN, Maximum edge distance = 1 m. Design a simply supported gantry girder, assuming the flange is laterally supported.
- |    |   |   |
|----|---|---|
| 10 | 5 | 4 |
|----|---|---|

**(OR)**

10. Design the angle purlin for the following data -
- |    |   |   |
|----|---|---|
| 10 | 5 | 4 |
|----|---|---|
- i) Span of purlin = 3.2 m
  - ii) Dead load on purlin = 1200 N/m
  - iii) Live load on purlin = 400 N/m.
  - iv) Wind load on purlin = 1600 N/m .
- Apply check as per IS 800 requirements.

### **UNIT-VI**

11. Design a welded plate girder of span 30m to carry a superimposed load of 50kN/m. avoids use of bearing and intermediate stiffeners.
- |    |   |   |
|----|---|---|
| 10 | 6 | 4 |
|----|---|---|

**(OR)**

12. Check the beam section WB 500 @1.45 kN/m against web crippling and web buckling if reaction at the end of beam is 179.6 KN, The length of bearing plate at the support is 100 mm. Design bearing plate.
- |    |   |   |
|----|---|---|
| 10 | 6 | 3 |
|----|---|---|

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		Marks	CO	Blooms Level
<b><u>UNIT-I</u></b>				
1.	What is list? Explain various types of lists with a program.	10	CO1	L2
<b>(OR)</b>				
2. a.	What is the use of CSS? Explain different types of CSS with a program.	5	CO1	L3
b.	Explain different selector forms?	5	CO1	L2
<b><u>UNIT-II</u></b>				
3. a.	Explain about Pattern Matching using Regular Expressions in detail, with example?	5	CO2	L3
b.	Discuss Angular JS Form Validation & Form Submission with example?	5	CO2	L3
<b>(OR)</b>				
4.	Define Function with its syntax .Write an example program to illustrate the functions concept?	10	CO2	L4
<b><u>UNIT-III</u></b>				
5. a.	What is DTD? Explain various types of DTD with a suitable Example	5	CO3	L2
b.	Write an xml code to display book information and validate it.	5	CO3	L3
<b>(OR)</b>				
6.	Explain the basic structure of an XML document. Differentiate XML and HTML?	10	CO3	L3
<b><u>UNIT-IV</u></b>				
7.	Write jdbc program to insert write and access the data from the given database	10	CO4	L3
<b>(OR)</b>				
8. a.	Explain types of jdbc drivers in detail.	5	CO4	L2
b.	Illustrate JDBC API?	5	CO4	L3
<b><u>UNIT-V</u></b>				
9. a.	Explain the life cycle of servlet in detail	5	CO5	L2
b.	Write a servlet program to read data from database.	5	CO5	L3
<b>(OR)</b>				
10. a.	Write short notes on javax.servlet Package?	5	CO5	L2
b.	Explain servlet and Servlet API with example?	5	CO5	L3
<b><u>UNIT-VI</u></b>				
11. a.	Discuss about JSP directives and scripting elements?	5	CO6	L4
b.	Write a JSP program to store and retrieve the Employee details from MySQL data base	5	CO6	L3
<b>(OR)</b>				
12. a.	Explain about JSP Actions, JSTL?	5	CO6	L2
b.	Write a JSP program to store and retrieve the Student details from MySQL data base.(Student table contains: rollno, name, branch,year)	5	CO6	L4

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	<u>UNIT-I</u>	Marks	CO	Blooms Level
1. a)	Explain about linear Shift invariant system with necessary equations	(5M)	CO1	K2
b)	Test the stability of the system whose impulse response is given by	(5M)	CO1	K3
	(i) $h(n) = \left(\frac{1}{n}\right)^n u(n)$ ii) $h(n) = e^{2n} u(n-1)$			
	(OR)			
2. a)	Explain about causality with necessary equations	(5M)	CO1	K2
b)	Compute inverse z-transform of $X(z) = \frac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}$ ROC $ z  > 2$ using partial fraction expansion method	(5M)	CO1	K3
	<u>UNIT-II</u>			
3. a)	State and prove linearity and circular convolution property of DFT	(5M)	CO2	K3
b)	Compute the DFT of a sequence $\{1, -1, 1, -1\}$ .	(5M)	CO2	K3
	(OR)			
4. a)	What is linear convolution and explain how to find out linear convolution using DFT	(5M)	CO2	K2
b)	Compute IDFT of $X(k) = \{3, 2 + j, 1, 2 - j\}$	(5M)	CO2	K3
	<u>UNIT-III</u>			
5. a)	An 8-point sequence is given by $x[n] = \{0, 1, 2, 3, 4, 5, 6, 7\}$ . Compute 8-point DFT of $x(n)$ using radix-2 DIT FFT algorithm	(6M)	CO3	K3
b)	Compare DIT and DIF algorithms	(4M)	CO3	K2



(OR)

6. Explain Radix-2 DIF FFT algorithm with neat sketch (10M) CO3 K2

**UNIT-IV**

7. a) Compare Butterworth and Chebyshev filter. (4M) CO4 K2  
b) Determine the transfer function  $H(z)$  for the analog transfer function  $H(s)=2/(s+1)(s+2)$  with impulse invariant transformation with  $T=1\text{sec}$  (6M) CO4 K3

(OR)

8. a) Explain Direct form and parallel form realization of IIR filter (4M) CO4 K3  
b) What are the steps to design analog chebyshev low pass filter and explain. (6M) CO4 K2

**UNIT-V**

9. a) Compare FIR and IIR digital filters (4M) CO5 K2  
b) Explain Hanning window and Hamming window (6M) CO5 K2

(OR)

- 10 a) The frequency response of FIR low pass filter is given by (6M) CO5 K3

$$H_d(e^{j\omega}) = 1 \text{ for } -\frac{\pi}{2} \leq \omega \leq \frac{\pi}{2}$$
$$= 0 \text{ for } \frac{\pi}{2} \leq |\omega| \leq \pi$$

Determine the filter coefficients for  $N=11$  using Rectangular window.

- b) What are the characteristics of FIR digital filters and explain (4M) CO5 K2

**UNIT-VI**

11. a) Explain about bus architecture. (5M) CO6 K2  
b) Explain interrupts of TMS320C54XX DSP Processor (5M) CO6 K2

(OR)

12. a) Explain basic architectural features of programmable DSP Processor (4M) CO6 K2  
b) Explain addressing modes of DSP processor (6M) CO6 K2

**POWER SYSTEM ANALYSIS**  
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

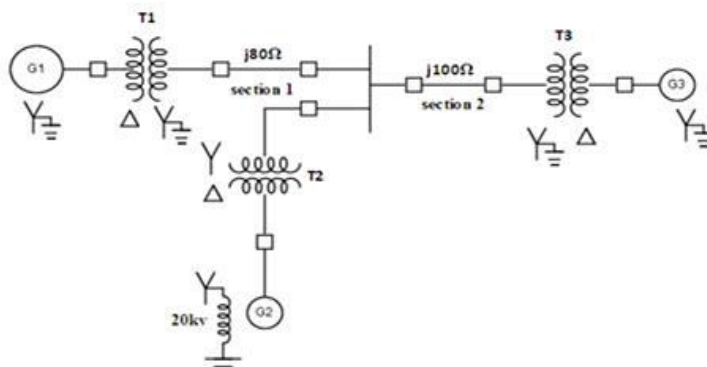
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**UNIT-I**

1. The single line diagram of an unloaded power system is shown in fig. The generator and transformers are rated as follows.

Marks 10 CO 1 Blooms Level Analyzing

Generator,  $G_1 = 20\text{MVA}$ , 13.8KV,  $X''=20\%$ Generator,  $G_2 = 30\text{MVA}$ , 18KV,  $X''=20\%$ Generator,  $G_3 = 30\text{MVA}$ , 20KV,  $X''=20\%$ Transformer,  $T_1 = 25\text{MVA}$ , 220/13.8KV,  $X=10\%$ Transformer,  $T_2 = 3$  single phase units each rated at 10MVA, 127/18KV,  $X=10\%$ Transformer,  $T_3 = 35\text{MVA}$ , 220/22KV,  $X=10\%$ Draw the reactance diagram using a base of 50MVA and 13.8KV on generator  $G_1$ .

(OR)

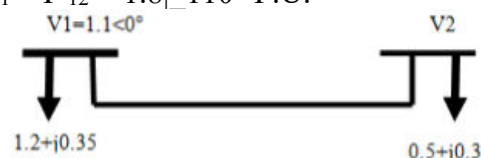
2. a Derive expression for the  $Y_{\text{bus}}$  formation of power system. 5 1 Understanding  
b A generator rated 25MVA, 11kv has a reactance of 15%. 5 1 Applying  
Calculate its p.u. reactance for a base of 50 MVA and 10 kv.

**UNIT-II**

3. a Classify buses in a power system and discuss the significance of slack bus. 5 2 Understanding  
b Derive load flow algorithm using Gauss – Seidal method with flow chart 5 2 Applying

(OR)

4. A two bus system is shown in below figure. Calculate the bus 2 voltage at the end of first iteration by G-S method. The elements of bus admittance matrix are  $Y_{11} = Y_{22} = 1.5 \angle -86^\circ$  P.U and  $Y_{21} = Y_{12} = 1.8 \angle 110^\circ$  P.U.



### UNIT-III

5. Perform one iteration of Newton-Raphson load flow method and determine the power flow solution for a given power system. Base MVA as 100. 10 3 Analyzing

Line Data:

Line	Bus		R in p.u	X in p.u	Half line charging admittance
	From	To			
1	1	2	0.0839	0.5183	0.0636

Bus Data:

Bus	P <sub>L</sub>	Q <sub>L</sub>
1	90	20
2	30	10

(OR)

6. a Describe the Newton-Raphson method for the solution of power flow equations in power system deriving necessary equations. 6 3 Applying
- b Compare Newton-Raphson and Fast Decoupled Load Flow methods. 4 3 Understanding

### UNIT-IV

7. Build the ZBus for a power system whose element data is given in the following table: 10 4 Applying

Element No.	Connected between bus No.	Self-reactance (p.u.)
1	1-2	0.3
2	1-3	0.4
3	2-3	0.5

(OR)

8. The section bus-bars A and B are linked by a bus-bar reactor rated at 5000KVA with 10% reactance. On bus-bar A there are two generators each of 10000KVA with 10% reactance and on bus-bar B two generators each of 8000KVA with 12% reactance. Calculate the short circuit MVA fed into a dead short circuit between all phases on bus-bar section B with bus-bar reactor in the circuit. 10 4 Applying

### UNIT-V

9. What do you understand by sequence networks? What is their importance in unsymmetrical fault calculations? 10 5 Understanding

(OR)

10. Derive an expression for fault current in Line to ground fault. Also draw sequence network connections. 10 5 Applying

### UNIT-VI

11. a Derive the expressions for the critical clearing time and critical clearing angle. 5 6 Understanding
- b A 200 MVA, 2 pole, 50 Hz alternator has a moment of inertia of 50000 Kg-m<sup>2</sup>. What is the energy stored in the rotor at the rated speed? Find the value of H and determine the corresponding angular momentum. 5 6 Applying

(OR)

12. a Describe the equal area criterion. 4 6 Understanding
- b Starting from first principles, derive the swing equation of a Synchronous machine. Define inertia constant. 6 6 Applying

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	<b><u>UNIT-I</u></b>	Marks	CO	Blooms Level
1.	Discuss the significance of managerial economics in decision-making. Explain with examples.	10	1	Understand
	<b>(OR)</b>			
2. a	Explain the concept of demand determinants and their impact on the market.	5	1	Understand
b	Describe the types of elasticity of demand used in business strategy formulation.	5	1	Understand
	<b><u>UNIT-II</u></b>			
3.	Explain any five types of demand forecasting used in managerial decision-making. Provide suitable examples.	10	2	Understand
	<b>(OR)</b>			
4. a	Explain the importance of statistical methods in demand forecasting.	5	2	Understand
b	Explain test marketing and expert opinion methods in demand forecasting.	5	2	Understand
	<b><u>UNIT-III</u></b>			
5.	The cost structure of XYZ Ltd. is given below:  Fixed Cost: Rs. 1,50,000 Variable Cost per unit: Rs. 20 Selling Price per unit: Rs. 50. Determine: a) Break-even point in units and sales value b) Profit at a sales volume of 6,000 units c) Margin of safety	10	3	Apply
	<b>(OR)</b>			
6. a	Discuss the law of returns to scale with relevant examples.	5	3	Understand
b	Define isoquants and iso-costs. Explain their significance in production decisions.	5	3	Understand

#### **UNIT-IV**

7. Discuss the price-output determination under monopolistic competition with graphical representation. 10 4 Understand

**(OR)**

8. a Explain the different types of market structures with examples. 5 4 Understand  
b What are the key features of monopoly and how does it differ from perfect competition? 5 4 Understand

#### **UNIT-V**

9. Illustrate the concept of capital budgeting. Discuss any two modern methods of project evaluation. 10 5 Apply

**(OR)**

10. A company is evaluating a project requiring an initial investment of Rs. 3,00,000. The expected annual cash inflows are given below: 10 5 Apply

Year	1	2	3	4	5
Cash in flows (Rs.)	70000	80000	90000	85000	750000

Compute payback period and Average Rate of Return (ARR).

#### **UNIT-VI**

11. Journalize the following transactions in the books of Raj & Co. 10 6 Apply

S No	Date	Particulars
01	01.01.2023	Started business with cash Rs.50,000
02	03.01.2023	Purchased goods for cash Rs.15,000
03	08.01.2025	Sold goods on credit to Rahul Rs.12,000
04	15.01.2023	Paid rent Rs.3,000
05	20.01.2025	Received cash from Rahul Rs.6,000
06	25.01.2025	Paid electricity bill Rs.800
07	30.01.2025	Salaries paid to employees Rs.5,000

**(OR)**

12. Discuss the significance of financial ratio analysis. Explain any five key financial ratios used in business analysis. 10 6 Understand

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<b><u>UNIT-I</u></b>				
1.	a) Explain the basic syntax of an HTML document.	5	CO1	L2
	b) How does the CSS Box Model work? Describe its components.	5	CO1	L3
<b>(OR)</b>				
2.	a) Explain the different levels of CSS styles (Inline, Internal, and External).	5	CO1	L2
	b) What is the difference between <th> and <td> in an HTML table?	5	CO1	L3
<b><u>UNIT-II</u></b>				
3.	a) Write a JavaScript program to display an alert box with the message "Welcome to JavaScript!" when a webpage loads.	5	CO2	L3
	b) Write a JavaScript program to display the numbers from 1 to 10 using a <b>for loop</b> .	5	CO2	L3
<b>(OR)</b>				
4.	a) Illustrate control statements in JAVA script with example programs?	5	CO2	L2
	b) What are the methods and properties of MATH object in JavaScript	5	CO2	L4
<b><u>UNIT-III</u></b>				
5.	a) Write the role of <b>Expressions</b> in Angular JS. How do they differ from JavaScript expressions?	5	CO3	L3
	b) Write an Angular JS expression to display the sum of two numbers entered by a user.	5	CO3	L2
<b>(OR)</b>				
6.	a) Explain MVC architecture with example in angular JS.	5	CO3	L3
	b) Write any five directives with example in angular JS.	5	CO3	L3
<b><u>UNIT-IV</u></b>				
7.	a) What is <b>XML</b> , and how is it different from HTML?	5	CO4	L2
	b) Explain the purpose of <b>Document Type Definition (DTD)</b> in XML.	5	CO4	L2
<b>(OR)</b>				
8.	a) How does an XML Schema differ from a DTD?	5	CO4	L2
	b) What are the main advantages of using XML schemas?	5	CO4	L3
<b><u>UNIT-V</u></b>				
9.	a) Explain the <b>JDBC Architecture</b> with a diagram.	5	CO5	L2
	b) How does <b>session management</b> work in Servlets?	5	CO5	L2
<b>(OR)</b>				
10.	a) Explain the <b>Servlet life cycle</b> with a diagram.	5	CO5	L2
	b) Implement a <b>JDBC connection</b> using the <b>PreparedStatement</b> to insert a new record into a table.	5	CO5	L3
<b><u>UNIT-VI</u></b>				
11.	a) Explain the <b>JSP life cycle</b> with a diagram.	5	CO6	L2
	b) What is <b>JSTL (Java Server Pages Standard Tag Library)</b> , and why is it used?	5	CO6	L2
<b>(OR)</b>				
12.	a) Write a simple <b>JSP program</b> that displays "Welcome to JSP!" on the webpage.	5	CO6	L3
	b) What is <b>JSP</b> , and how does it differ from Servlets?	5	CO6	L2

# AR18

**CODE: 18CET317**

**SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech II Semester Supplementary Examinations, April, 2025**

**Basic Design of Steel Structures  
(CIVIL ENGINEERING)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

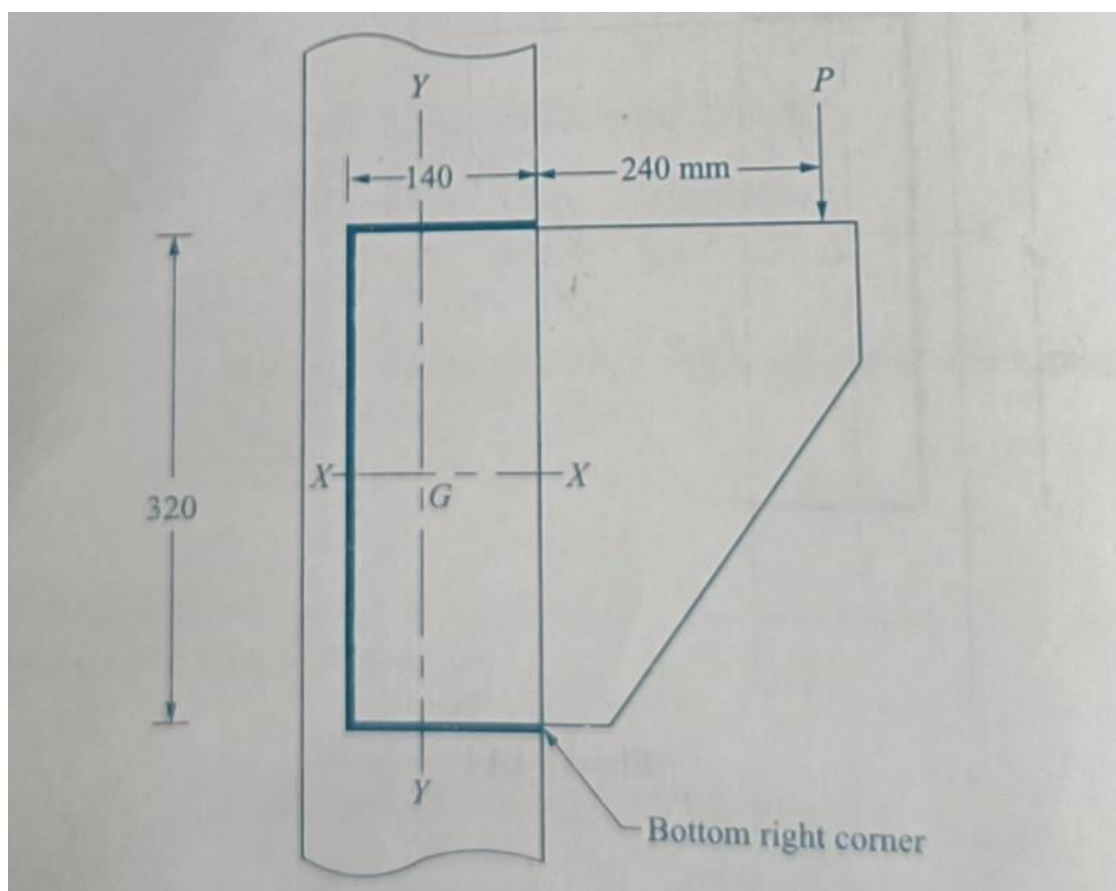
All parts of the Question must be answered at one place

## UNIT-I

1. Compute strength of bolt for a connection to join two plates of size  $250 \times 10\text{mm}$  of grade Fe 410 to mobilize full plate tensile strength using shop fillet welds, if (i) a lap joint is used, (ii) a double cover butt joint is used. Design a connection to join two plates of size  $250 \times 10\text{mm}$  of grade Fe 410 to mobilize full plate tensile strength using shop fillet welds, if (i) a lap joint is used, (ii) a double cover butt joint is used. (12M)

**(OR)**

2. Determine the maximum load that can be resisted by the bracket shown in the figure, by fillet welding size  $6\text{mm}$ , if it is shop welding (12M)



## **UNIT-II**

3. Design a simply supported beam of span 6 m and it has to carries a factored UDL of 30kN/m (excluding the self-weight). The beam is laterally unsupported. Use  $f_y = 250$  MPa. (12M)

**(OR)**

4. An ISMB 500 section is used as a beam over a span of 6m, with simply supported ends. Determine the Maximum factored uniformly distributed load that beam can carry if the ends are restrained against torsion but compression flange is laterally unsupported (12M)

## **UNIT-III**

5. Design a compression member of two channels placed toe-to-toe. The length of the compression member is 12m and carries a load of 1500kN The width over the backs of channels is 450mm. The channels are connected by double lacing. Sketch the cross-section of the column. (12M)

**(OR)**

6. a) Write about different types of tension members. (4M)  
b) Design a tension member to carry a load of 280 kN. The two angles placed back to back with long legs out standing are desirable. The length of the member is 2.9m.8M (8M)

## **UNIT-IV**

7. Design an I-section purlin for an industrial building to support a galvanized corrugated iron sheet given spacing of the trusses=6 m, Inclination of the main rafter=  $30^\circ$ , Spacing of purlins=1.5 m, Weight of corrugated sheeting =  $130 \text{ N/m}^2$ , Live load =  $0.6 \text{ kN/m}^2$ , Wind load =  $1.8 \text{ kN/m}^2$ , suction, Yield stress in steel = 250 MPa. (12M)

**(OR)**

8. A hand operated 50 kN overhead crane is provided in a workshop. The details are given below: Centre to centre between gantry girders = 16 m, Span of the gantry girder = 6 m, Weight of the crane = 40 kN, Wheel spacing = 3 m, Weight of the crab = 10kN, Maximum edge distance=1 m, Design a simply supported gantry girder, assuming the flange is laterally supported (12M)

## **UNIT-V**

9. Design a welded plate girder to carry a superimposed load of 10 tonnes per metre on an effective span of 24 metres. Assume necessary data. (12M)

**(OR)**

10. A mild steel plate girder simply supported at two ends has an effective span of 20m. It carries a dead load of 50kn/m and uniformly distributed live load of same intensity, longer than the span. Design the maximum section of the plate girder. Assume the data if any missing. (12M)



Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

1. a) Determine the even and odd components of the following signals. 6M  
 (i).  $x(n) = \{3, 2, 1, 4, 5\}$  (ii).  $x(n) = \cos n + \sin n$   
 b) Explain the various classification of signals with examples. 6M
- (OR)**
2. a) State and prove any three properties of z-transform. 6M  
 b) Find the z-transform of the signal  $x(n) = na^n u(n)$  6M

**UNIT-II**

3. a) State and prove the convolution property of DFT. 6M  
 b) Find the 4-point DFT of the signal  $x(n) = \{1, 2, 3, 4\}$  6M
- (OR)**
4. a) Draw the butterfly diagram of 8-point radix-2 DIF algorithm and explain. 6M  
 b) Find the 8-point DFT of the sequence  $x(n) = \cos\left(\frac{n\pi}{2}\right)$  using radix-2 DIF FFT algorithm. 6M

**UNIT-III**

5. a) Explain the parallel form realization of IIR filters with suitable example. 4M  
 b) Obtain the cascade form realization of the filter 8M  

$$y(n) + \frac{1}{16} y(n-1) + \frac{1}{6} y(n-2) - \frac{1}{24} y(n-3) - \frac{1}{16} y(n-4)$$

$$= x(n) + \frac{5}{6} x(n-1) + x(n-2) + \frac{13}{36} x(n-3) + \frac{1}{6} x(n-4)$$
- (OR)**
6. a) Derive the frequency response of FIR filter with impulse response is odd and symmetric. 6M  
 b) Write a matlab program to design a butterworth digital band pass filter with pass band and stop band attenuation of -3 dB and -10 dB respectively. The passband cutoff frequencies are 600 Hz and 1000 Hz and the stop band cut off frequencies are 300 Hz and 1600 Hz. The sampling frequency is 5000 hz. 6M

**UNIT-IV**

7. a) Explain LMS algorithm with suitable mathematical equations. 6M  
 b) Explain the characteristics of adaptive filters. 6M
- (OR)**
8. a) Explain direct form linear prediction filtering. 6M  
 b) Write the properties of LMS adaptive filters. 6M

**UNIT-V**

9. a) Explain Harvard architecture with suitable diagram. 6M  
 b) Draw the architecture of TMS320C54XX processor and explain briefly. 6M
- (OR)**
10. Explain the different addressing modes of TMS320C54XX processors. 12M

# AR18

**CODE: 18EET315**

**SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech II Semester Supplementary Examinations, April, 2025**

**POWER SYSTEM ANALYSIS  
(ELECTRICAL AND ELECTRONICS ENGINEERING)**

**Time: 3 Hours**

**Max Marks: 60**

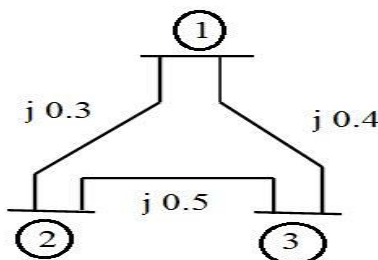
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

**UNIT-I**

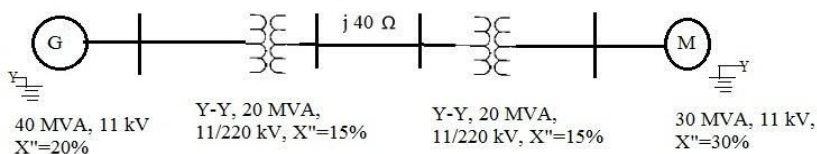
1. a) Derive the expressions for obtaining the pu values of impedance, voltage, current and power from the fundamentals. 6M
- b) Find the admittance matrix for the following network using direct inspection method.



6M

**(OR)**

2. Develop the p.u reactance diagram for the following network considering 100MVA and 11kV as base values.



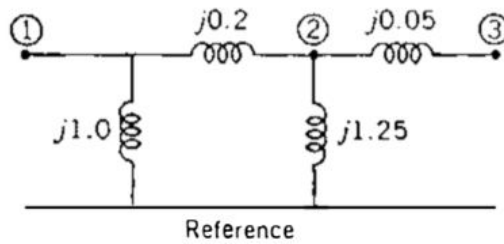
12M

**UNIT-II**

3. a) Explain the Decoupled load flow technique for solving load flows with an exact flow chart. 6M
- b) Derive the constant B matrices used in Fast Decoupled load flow in load flow studies. 6M
- (OR)**
4. a) Derive the expression for real power and reactive power used in static load flow studies from fundamentals. 8M
- b) Compare Newton-Raphson method and Gauss Siedel method load flow algorithms. 4M

### UNIT-III

5. Find the Z-bus matrix for the network shown in the following figure.



12M

(OR)

6. a) Two generating stations having short circuit capacities of 1200 MVA and 1000 MVA respectively and operating at 11kV are linked by an interconnected cable having a resistance of 0.6 ohm per phase, determine the short circuit capacity of each station. 8M
- b) Define short circuit MVA of synchronous machine and derive the formula for short circuit MVA 4M

### UNIT-IV

7. a) Briefly discuss about significance of positive negative and zero sequence impedances of an alternator. 6M
- b) Draw the zero sequence network diagrams for Delta/Star transformers. 6M
- (OR)
8. a) Derive the expression for 3-ph power in terms of symmetrical components. 8M
- b) A 3-Ph 11 kV, 25 MVA generator with  $X_0=0.05$  p.u,  $X_1=X_2=0.2$  p.u is grounded through a reactance of 0.3 ohms. Determine the fault current for a LLG fault. 4M

### UNIT-V

9. Explain the concept of equal area criterion for studying the transient stability. 12M
- (OR)
10. Derive the expression for critical clearing angle for a generator system feeding double circuit line. 12M

# AR18

**CODE: 18MET313**

**SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)**

**III B.Tech II Semester Supplementary Examinations, April, 2025**

**CAD/CAM  
(MECHANICAL ENGINEERING)**

**Time: 3 Hours**

**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

## UNIT-I

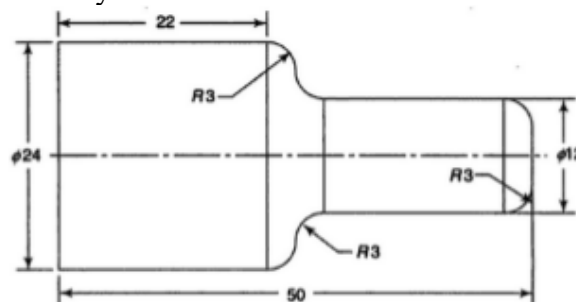
1. a) State the functions of an interactive computer graphics in CAD/CAM? 6M  
b) Explain about the following 3D transformations: 6M  
(i) Translation (ii) Rotation (iii) Scaling
- (OR)
2. a) Discuss the benefit of CAD/CAM. 6M  
b) Explain the product cycle and CAD/CAM product cycle? 6M

## UNIT-II

3. a) Define the cubic spline and Bezier curves? 6M  
b) Explain the Constructive Solid Geometry (CSG) method to create models? 6M
- (OR)
4. a) Explain Bezier curve with a neat sketch. Explain its advantages and limitations. 6M  
b) Find the degree of Bezier curve controlled by three points (4, 2), (0, 0) and (2, 8). Also find the equation of the Bezier curve in parametric format with parameter "u"? 6M

## UNIT-III

5. a) Explain the difference between CNC and DNC along with neat sketches. 6M  
b) Write NC part program for the part shown in the below shown in figure. All the dimensions are in mm only. 6M



(OR)

6. a) List out and Explain about basic components of an NC system and CNC system? 6M  
b) Differentiate Manual part programming and Computer assisted part programming? 6M

#### **UNIT-IV**

7. a) What is group technology? When is it suitable in manufacturing? What are its benefits? 6M  
b) What is CAPP? Explain the any one type of Capp with neat sketches. 6M

**(OR)**

8. a) What is a part family? Explain various methods of part formation? 6M  
b) Explain the Retrieval type system with neat sketch and explain the Benefits of CAPP? 6M

#### **UNIT-V**

9. a) Define FMS and state applications of FMS? 6M  
b) Discuss the following types of layouts in the design of FMS:  
(i) Circular layer (ii) Linear layers (iii) Loop layers 6M

**(OR)**

10. a) Draw the FMS layout and explain the function of each component of FMS. 6M  
b) Describe the Scheduling and Dispatching issues related to FMS (Flexible Manufacturing System). 6M