



**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING  
(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram-521 230 :: NTR Dist. :: A.P  
Approved by AICTE, New Delhi. Affiliated to JNTUK, Kakinada

**B.Tech. (V Semester) (R23) Semester End Examinations (Regular) – November 2025**

**TIME TABLE**

**R23**

Time : 10.00 AM to 01.00 PM

A.Y. : 2025-26

Branch	18-11-2025 (Tuesday)	20-11-2025 (Thursday)	22-11-2025 (Saturday)	25-11-2025 (Tuesday)	27-11-2025 (Thursday)	29-11-2025 (Saturday)
					Open Elective - I	Program Elective - I
AI & DS	<b>Minor</b> 23ADM1-Introduction To Artificial Intelligence and Data Science (ASE, ECE & ME)  23AMM1-Principles of Artificial Intelligence (ASE & EEE)  23CSM4-Introduction to Database systems (CE, ECE, EEE & ME)  <b>Honors</b> 23ECH4-Real Time Operating Systems (ECE)  23PEH1-Advanced Electric Machines (EEE)	23AD04-Data Warehousing and Data Mining	23AM03-Principles of Machine Learning	23AD05-Data Visualization	23ME81- Sustainable Energy Technologies	23AD07-Exploratory Data Analysis with Python
ASE		23AE07-Aerospace Vehicle Structures	23AE08-Gas Dynamics	23AE09-Aircraft Systems and Instruments	23EC85- Fundamentals of Satellite Communications	23AE11- Finite Element Analysis
CE		23CE08-Design and Drawing of Reinforced Concrete Structures	23CE09-Engineering Hydrology	23CE10-Geotechnical Engineering-I	23ME81- Sustainable Energy Technologies	23CE13-Construction Technology and Management
CSE		23AD04-Data Warehousing and Data Mining	23CS07-Computer Networks	23CS08-Formal Languages and Automata Theory	23ME81- Sustainable Energy Technologies	23AD02-Artificial Intelligence
CSE (AI&ML)		23AM02-Information Retrieval Systems	23CS07-Computer Networks	23CS06-Operating Systems	23ME81- Sustainable Energy Technologies	23CS11-Cloud Computing
ECE		23EC08-Analog & Digital IC Applications	23EC09-Digital Communications	23EC10-Antennas and Wave Propagation	23AM81-Python Programming for AI & ML	23EC12- Digital System Design through HDL
EEE		23EE10-Power Electronics	23EE11-Digital Circuits	23EE12-Power Systems-II	23AD82-Fundamentals of Data Science	23EC27- Communication systems
IT		23IT04-Advanced Java	23CS07-Computer Networks	23CS12-Automata Theory & Compiler Design	23ME82- Introduction to Industrial Robotics 23EC85-Fundamentals of Satellite Communications	23AD02-Artificial Intelligence
ME		23ME10-Machine Tools and Metrology	23ME11-Thermal Engineering	23ME12-Design of Machine Elements	23EE84-Electric Vehicles	23ME16-Industrial Robotics

Note(s): Any omissions or clashes in the time table may please be informed to the Controller of Examinations immediately.

Date: 01-11-2025

**CONTROLLER OF EXAMINATIONS**

**PRINCIPAL**

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B.Tech. (V Semester) Regular Examinations

**23ADM1-INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND DATA SCIENCE**  
(ASE,ECE&ME)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List any two foundations of Artificial Intelligence.	2M	CO1	L1
(b)	State the components of AI agents.	2M	CO1	L1
(c)	Write the difference between informed search and uninformed search.	2M	CO2	L1
(d)	Define a heuristic function in AI.	2M	CO2	L2
(e)	Define knowledge representation in Artificial Intelligence.	2M	CO3	L1
(f)	What is propositional logic?	2M	CO3	L1
(g)	List any two operations that can be performed on NumPy arrays.	2M	CO4	L1
(h)	Define Data Science.	2M	CO4	L1
(i)	List the two core data structures used in pandas.	2M	CO5	L1
(j)	Define Index object in pandas.	2M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Illustrate the evolution of AI through timeline diagram.	5M	CO1	L2
(b)	Describe the structure of AI agents with suitable example.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Draw and explain the hierarchy of Artificial Intelligence foundations.	5M	CO1	L1
(b)	Explain the characteristics of different types of environments in AI.	5M	CO1	L2
4.	Apply Breadth First Search (BFS) to solve the 8-puzzle problem. Represent the state space diagram.	10M	CO2	L3
<b>(OR)</b>				
5.	Apply a Local Search Algorithm (Hill Climbing) to find the local optimum for a given function. Show stepwise evaluation.	10M	CO2	L3
6(a)	<b>Discuss any 2 approaches to knowledge representation</b> with examples.	5M	CO3	L2
(b)	Explain how AI systems model perception, belief, and intention.	5M	CO3	L2
<b>(OR)</b>				
7(a)	Show how simple facts can be represented as propositions and combined using logical connectives with examples.	5M	CO3	L2
(b)	Write short notes on ontological engineering.	5M	CO3	L2
8(a)	<b>Write a NumPy program</b> to create two arrays and perform the following operations: (i) Element-wise addition (ii) Scalar multiplication (iii) Display the output.	5M	CO4	L3
(b)	Write short notes on the data science process.	5M	CO4	L2
<b>(OR)</b>				
9(a)	Use NumPy slicing and indexing to extract specific rows and columns from a given 2D array. Demonstrate with an example array and show the resulting subsets.	5M	CO4	L3
(b)	Explain <b>Exploratory Data Analysis (EDA)</b> and its significance in Data Science.	5M	CO4	L2
10(a)	Apply pandas functions to <b>detect, remove, and fill missing values</b> in a dataset (demonstrate with code).	5M	CO5	L3
(b)	Illustrate how <b>sorting and ranking</b> are performed in pandas with an example.	5M	CO5	L3
<b>(OR)</b>				
11(a)	Explain the difference between a pandas <b>Series</b> and a <b>DataFrame</b> with suitable examples.	5M	CO5	L2
(b)	Use Pandas to summarize descriptive statistics (mean, standard deviation, minimum, maximum, etc.) of a dataset and interpret the results.	5M	CO5	L3

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B.Tech. (V Semester) Regular Examinations

**23AMM1-PRINCIPLES OF ARTIFICIAL INTELLIGENCE**  
(ASE & EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are actuators in agents?	2M	CO1	L1
(b)	Define model-based reflex agent.	2M	CO1	L1
(c)	Define Depth First Search (DFS).	2M	CO2	L1
(d)	Give two applications of AI in healthcare.	2M	CO2	L1
(e)	Differentiate between single-player and two-player games.	2M	CO3	L2
(f)	What is an evaluation function in game playing?	2M	CO3	L1
(g)	Difference between syntax and semantics?	2M	CO4	L2
(h)	Give one example of Knowledge Representation in real-world AI systems.	2M	CO4	L1
(i)	What is an expert system shell?	2M	CO5	L1
(j)	Define the term knowledge engineer.	2M	CO5	L1
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	With a neat diagram, explain the structure of an intelligent agent.	5M	CO1	L2
(b)	Write briefly about the history and evolution of AI.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Define Artificial Intelligence and explain its foundations.	5M	CO1	L2
(b)	Explain different types of agents with examples.	5M	CO1	L2
4.	Apply the AO* algorithm to solve the following AND-OR graph problem.	10M	CO2	L3
<b>(OR)</b>				
5(a)	What are uninformed search strategies? Explain BFS and DFS with examples.	5M	CO2	L2
(b)	Explain the Hill Climbing algorithm and its drawbacks.	5M	CO2	L2
6(a)	What is adversarial search? Give examples.	5M	CO3	L2
(b)	Describe the Min-Max algorithm with an example game tree.	5M	CO3	L2
<b>(OR)</b>				
7(a)	Explain optimal decision making in games.	5M	CO3	L2
(b)	What is Alpha-Beta pruning? How does it improve efficiency?	5M	CO3	L2
8(a)	What is knowledge representation? Discuss its importance in AI.	5M	CO4	L2
(b)	Define and explain substitution and unification with examples.	5M	CO4	L2
<b>(OR)</b>				
9.	Discuss the concepts of deduction, soundness, completeness, consistency, and satisfiability in logic.	10M	CO4	L2
10(a)	Explain knowledge acquisition and meta-knowledge in expert systems.	5M	CO5	L2
(b)	Write a short note on DART and XCON expert systems.	5M	CO5	L2
<b>(OR)</b>				
11(a)	Define expert systems and explain their architecture.	5M	CO5	L2
(b)	Explain the working of MYCIN expert system.	5M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23CSM4-INTRODUCTION TO DATABASE SYSTEMS**

(CE,ECE,EEE &amp; ME)

g, n, v

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What do you mean by Database schema?	2M	CO1	L1
(b)	State the types of Data Independence.	2M	CO1	L1
(c)	What is the difference between a Primary Key and a Candidate Key?	2M	CO2	L2
(d)	Define a trigger in SQL.	2M	CO2	L1
(e)	Define Normalization.	2M	CO3	L1
(f)	What is a Transitive Dependency?	2M	CO3	L1
(g)	What is a Shared Lock?	2M	CO4	L1
(h)	What is View Serializability?	2M	CO4	L1
(i)	Define Checkpoint in the context of database recovery.	2M	CO5	L1
(j)	What is secondary index?	2M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Explain the differences between a Database System and a File System.	5M	CO1	L2
(b)	Discuss different Database Languages in a DBMS and their functions with examples.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Define Keys in a relational model. Discuss Super Key, Candidate Key, and Primary Key with examples.	5M	CO1	L3
(b)	Describe the different types of attributes in an ER Model with examples and notations.	5M	CO1	L2
4.	Explain the basic concepts of the Relational Data Model with suitable examples.	10M	CO2	L2
<b>(OR)</b>				
5(a)	Explain Aggregate Functions in SQL. Describe their role with examples for each.	5M	CO2	L2
(b)	Explain Set Operations UNION, INTERSECTION and MINUS with syntax and examples.	5M	CO2	L2
6(a)	What is Boyce-Codd Normal Form (BCNF)? Explain how it differs from 3NF with an example.	5M	CO3	L2
(b)	Consider the following relation R(ABCD) and FDs A->BC, is the decomposition of R into R1(A, B, C), R2(A, D). Check if the decomposition is lossless join or not.	5M	CO3	L3
<b>(OR)</b>				
7(a)	Given a relation R(ABCDEF) having FDs (AB->C, C->DE, E->F, C->B) Identify the prime attributes and non-prime attributes.	5M	CO3	L3
(b)	Discuss in detail the advantages and disadvantages of normalization in database design.	5M	CO3	L3
8(a)	What is a Deadlock in database systems? Explain various methods of Deadlock Handling.	5M	CO4	L2
(b)	Discuss the concept of Schedules. How does serial and non-serial scheduling affect transaction consistency.	5M	CO4	L3
<b>(OR)</b>				
9.	Explain the concept of Recovery with Concurrent Transactions. How does concurrency affect recovery mechanisms?	10M	CO4	L2
10(a)	Explain the phases of recovery in a DBMS after a system crash.	5M	CO5	L2
(b)	Describe Dense and Sparse Indexing. Differentiate between them with examples.	5M	CO5	L3
<b>(OR)</b>				
11(a)	Construct B+ tree with the following elements 7, 10, 1,23,5,15,17, 9, 11, 34, 35, 8, 40, 25.	5M	CO5	L3
(b)	What is Hashing? Explain Static and Dynamic Hashing techniques with diagrams.	5M	CO5	L3

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B.Tech. (V Semester) Regular Examinations

**23ECH4-REAL TIME OPERATING SYSTEMS**  
(ECE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List any two services of an RTOS.	2 M	CO1	L1
(b)	Define interrupt latency.	2 M	CO1	L2
(c)	What is meant by a task in RTOS?	2 M	CO1	L1
(d)	Define preemptive scheduling.	2 M	CO1	L2
(e)	What is an RTOS kernel?	2 M	CO2	L1
(f)	Mention any two features of Vx Works.	2 M	CO2	L2
(g)	What is an embedded system for mobile phone key inputs?	2 M	CO3	L2
(h)	Name two main components of a digital camera system.	2 M	CO3	L1
(i)	Define system call in Linux.	2 M	CO4	L2
(j)	What is the purpose of semaphore in RT Linux?	2 M	CO4	L2
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Explain basic design issues of a Real-Time Operating System.	5 M	CO1	L2
(b)	Discuss process management and event functions in RTOS.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe task scheduling models in RTOS.	5 M	CO1	L2
(b)	Explain interrupt handling and response time metrics.	5 M	CO1	L2
<b>(OR)</b>				
4(a)	Explain basic functions and types of RTOS used for embedded systems.	5 M	CO2	L2
(b)	Describe programming concepts of Vx Works.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Write short notes on mC/OS-II and its features.	5 M	CO2	L2
(b)	Explain architecture and programming model of RT Linux.	5 M	CO2	L2
<b>(OR)</b>				
6(a)	Explain the case study of a digital camera system.	5 M	CO3	L2
(b)	Describe software modules of an adaptive cruise control (ACC) system.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Draw and explain block diagram of mobile phone software for key inputs.	5 M	CO3	L2
(b)	Discuss design metrics of an embedded system for a smart card.	5 M	CO3	L2
<b>(OR)</b>				
8(a)	Explain the process of creating a target image for Windows XP Embedded.	5 M	CO4	L2
(b)	Describe the role of hardware abstraction layer (HAL) in RTOS porting.	5 M	CO4	L2
<b>(OR)</b>				
9(a)	Explain system programming in Unix/Linux environment.	5 M	CO4	L2
(b)	Write a simple shell script to display system time periodically.	5 M	CO4	L3
<b>(OR)</b>				
10(a)	Explain architecture and features of RT Linux.	5 M	CO4	L2
(b)	Explain producer-consumer synchronization using semaphore in RT Linux.	5 M	CO4	L3
<b>(OR)</b>				
11(a)	List applications of RT Linux.	5 M	CO4	L2
(b)	Describe dual-kernel mechanism of RT Linux with neat sketch.	5 M	CO4	L2

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B.Tech. (V Semester) Regular Examinations

**23PEH1-ADVANCED ELECTRIC MACHINES  
(EEE)**

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the function of damping in AC servomotors?	2M	CO1	L1
(b)	Write any two advantages of permanent magnet DC servomotor.	2M	CO1	L1
(c)	What is monofilar winding in stepper motor?	2M	CO1	L2
(d)	What is meant by "step angle" in a stepper motor?	2M	CO1	L2
(e)	Mention two differences between a universal motor and an induction motor.	2M	CO2	L1
(f)	Draw a neat phasor diagram of a single-phase AC series motor.	2M	CO2	L1
(g)	What is the principle of operation of reluctance motor?	2M	CO3	L1
(h)	Mention any four advantages of switched reluctance motor.	2M	CO3	L1
(i)	Mention the components of an equivalent circuit of a linear induction motor.	2M	CO3	L1
(j)	List the types of linear motors.	2M	CO3	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Describe the torque-speed characteristics of a permanent magnet armature-controlled DC servomotor.	5M	CO1	L2
(b)	Compare AC and DC servo motors.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Derive and discuss the performance characteristics of a two-phase AC servomotor.	5M	CO1	L3
(b)	Describe the construction and working of DC servo motors.	5M	CO1	L2
4(a)	Explain the construction of multi stack Variable reluctance stepper motor with neat sketches.	5M	CO1	L2
(b)	Explain the construction and working principle of Hybrid Stepper motor.	5M	CO1	L2
<b>(OR)</b>				
5(a)	Compare VRSM, Permanent magnet and hybrid stepper motors.	5M	CO1	L2
(b)	Find the resolution of a stepper motor that is to be operated at an input pulse frequency of 6000 pulse/sec and travel a distance of 1800 in 0.025sec.	5M	CO1	L3
6(a)	Explain the construction and working principle of a hysteresis motor with a diagram.	5M	CO2	L2
(b)	Explain the construction and working principle of a single-phase AC series motor with a neat sketch.	5M	CO2	L2
<b>(OR)</b>				
7(a)	Enumerate the modifications to be done in design DC series motor to operate efficiently as an AC series motor.	5M	CO2	L2
(b)	A universal motor takes 2 A at 230 V DC and runs at 2000 rpm. When connected to 230 V AC, it draws the same current but runs at 1800 rpm. Calculate the power factor on AC supply.	5M	CO2	L3
8(a)	Discuss the merits of Switched Reluctance Motors compared to Induction Motors.	5M	CO3	L2
(b)	Discuss the working of single-phase synchronous reluctance motor.	5M	CO3	L2
<b>(OR)</b>				
9(a)	Derive the torque equation of Switched reluctance motor.	5M	CO3	L3
(b)	Classify power converters used for Switched Reluctance Motors.	5M	CO3	L2
10(a)	Discuss the various losses that occur in linear motors and their impact on efficiency.	5M	CO3	L2
(b)	Explain the construction and operation of a linear reluctance motor.	5M	CO3	L2
<b>(OR)</b>				
11.	Derive the expression for thrust developed in linear induction motor with necessary assumptions.	10M	CO3	L3

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**23AD04-DATA WAREHOUSING AND DATA MINING**  
(AI&DS and CSE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL	
1(a)	What is Data Mining?	2 M	CO1	L1	
(b)	Differentiate Data Warehouse and Data Cube.	2 M	CO1	L2	
(c)	How to handle missing values?	2 M	CO2	L2	
(d)	What is Data Integration?	2 M	CO2	L1	
(e)	What are the attribute selection measures?	2 M	CO3	L1	
(f)	List out the model evaluation techniques	2 M	CO3	L1	
(g)	List out the applications of frequent pattern mining.	2 M	CO4	L1	
(h)	Interpret association analysis.	2 M	CO4	L2	
(i)	What is the importance of clustering?	2 M	CO5	L1	
(j)	Write the strengths and weakness of K-means.	2 M	CO5	L1	
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>	
2.	Describe the Data Warehouse implementation.	10 M	CO1	L2	
<b>(OR)</b>					
3(a)	Explain about Data Cubes.	5 M	CO1	L2	
(b)	What are the major issues in Data Mining?	5 M	CO1	L1	
4.	Explain Data Cleaning and Data Integration techniques.	10 M	CO2	L2	
<b>(OR)</b>					
5(a)	Why data reduction is important? Explain about it.	5 M	CO2	L2	
(b)	Illustrate Data Discretization.	5 M	CO2	L3	
6(a)	Examine the Tree pruning approaches.	5 M	CO3	L3	
(b)	Describe the Decision Tree induction.	5 M	CO3	L2	
<b>(OR)</b>					
7(a)	Explain Bayes classification.	5 M	CO3	L2	
(b)	Illustrate about rule based classification.	5 M	CO3	L4	
8(a)	Analyze the frequent itemsets in the given dataset and generate the possible association rules.	5 M	CO4	L4	
	Transaction ID				Items Purchased
	T1				{Milk, Bread, Butter}
	T2				{Milk, Bread}
	T3				{Milk, Butter}
	T4				{Bread, Butter}
	T5	{Milk, Bread, Butter, Jam}			
(b)	Discuss the compact representation of frequent itemsets.	5 M	CO4	L2	
<b>(OR)</b>					
9.	Explain FP-Growth algorithm with an example.	10 M	CO4	L2	
10(a)	Categorize the different clustering techniques.	5 M	CO5	L4	
(b)	Explain about K-means algorithm.	5 M	CO5	L2	
<b>(OR)</b>					
11(a)	Discuss about DBSCAN algorithm.	5 M	CO5	L2	
(b)	Examine the strengths and weakness of DBSCAN.	5 M	CO5	L3	

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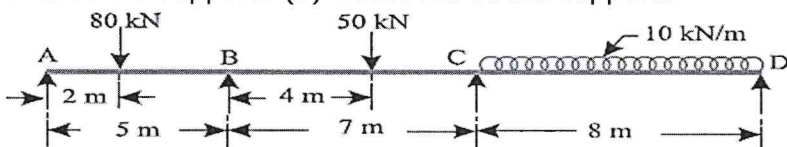
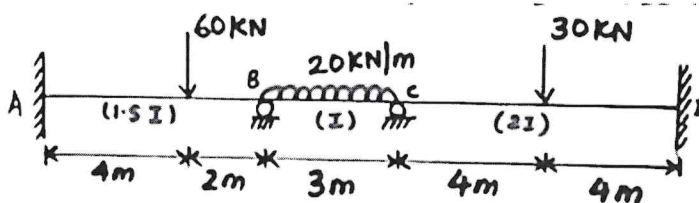
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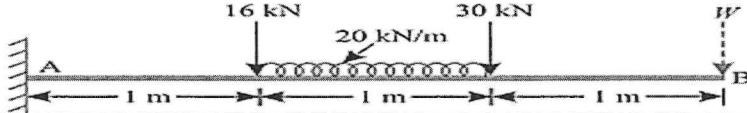
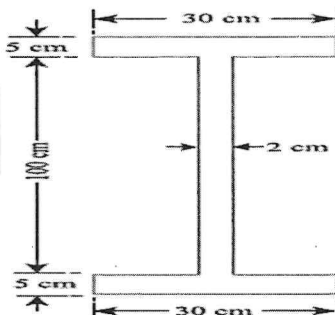
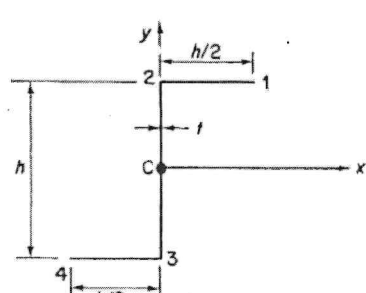
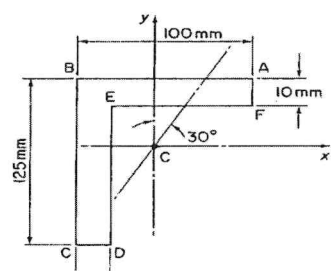
**23AE07-AEROSPACE VEHICLE STRUCTURES**  
(ASE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Choose the theories used for ductile failure.	2M	CO1	L1
(b)	Define failure envelope.	2M	CO1	L1
(c)	Is a propped cantilever beam a determinate structure or an indeterminate structure - why?	2M	CO2	L1
(d)	Describe two advantages of statically indeterminate beams.	2 M	CO2	L2
(e)	Maxwell reciprocal theorem can be applied only to linearly elastic structures. Justify.	2M	CO3	L2
(f)	A mild steel specimen is under uniaxial tensile stress. Young's modulus and yield stress for mild steel are $2 \times 10^5$ MPa and 250 MPa respectively. Calculate the maximum amount of strain energy per unit volume.	2M	CO3	L3
(g)	Differentiate between eccentrically loaded column and axially loaded column.	2M	CO4	L2
(h)	Sketch the first mode shapes of a pinned-pinned column.	2M	CO4	L2
(i)	What are the possibilities of unsymmetrical bending of beams?	2M	CO5	L1
(j)	Describe the stress distribution in beam with unsymmetrical section under skew load.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2.	Explain in detail the following theories (i) maximum Principal stress theory (ii) maximum Principal strain theory.	10M	CO1	L2
<b>(OR)</b>				
3.	In a material the principal stresses are $60 \text{ MN/m}^2$ , $48 \text{ MN/m}^2$ and $-36 \text{ MN/m}^2$ . Calculate: (i) Total strain energy (ii) Distortion energy theory (iii) Shear strain energy (iv) Factor of safety on the total strain energy criterion if the material yields at $120 \text{ MN/m}^2$ . Take: $E = 200 \text{ GN/m}^2$ , and $\nu = 0.3$ .	10M	CO1	L3
4	For the continuous loaded beam ABCD as shown in figure. Find the (i) Moments at the supports (ii) Reactions at the supports 	10M	CO2	L3
<b>(OR)</b>				
5.	Determine and draw the shear force and bending moment by using the Moment distribution method. Moment of Inertia : $AB = 1.5 I$ , $BC = I$ & $CD = 2I$ 	10M	CO2	L3
6 (a)	Describe primary function of airframe in aircraft structure.	5 M	CO3	L2
(b)	Calculate strain energy stored on a cantilever beam of length 4 m under point load at free end 120 kN and $E = 2 \times 10^5 \text{ N/mm}^2$ .	5 M	CO3	L3

(OR)

7.	<p>Using Castigliano's theorem, determine the deflection of the free end of the cantilever beam shown in Figure</p> 	10M	CO3	L3
8.	<p>A built-up beam shown in Fig. is simply supported at its ends. Compute its length, given that when it is subjected to a load of 40 kN per metre length, it deflects by 1 cm. Find out the safe load, if this beam is used as a column with both ends fixed. Assume a factor of safety of 4. Use Euler's formula. <math>E = 210 \text{ GN/m}^2</math>.</p> 	10M	CO4	L3
(OR)				
9.	<p>Compare the crippling loads given by Rankine's and Euler's formulae for tubular strut 2.25 m long having outer and inner diameters of 37.5 mm and 32.5 mm loaded through pin-joint at both ends. Take: Yield stress as <math>315 \text{ MN/m}^2</math>; <math>\alpha = 1/7500</math> and <math>E = 200 \text{ GN/m}^2</math>. If elastic limit for the material is taken as <math>200 \text{ MN/m}^2</math>, then for what length of the strut does the Euler formula cease to apply?</p>	10M	CO4	L3
10.	<p>Find the bending stress distribution in a thin walled Z section whose thickness is <math>t</math>, height <math>h</math>, flange width <math>h/2</math> and subjected to a positive bending moment <math>M</math>.</p> 	10M	CO5	L3
(OR)				
11.	<p>Figure shows the section of an angle purlin. A bending moment of 3,000 Nm is applied to the purlin in a plane at an angle of <math>30^\circ</math> to the vertical <math>y</math> axis. If the sense of the bending moment is such that both its components <math>M_x</math> and <math>M_y</math> produce tension in the positive <math>xy</math> quadrant, calculate the maximum direct stress in the purlin, stating clearly the point at which it acts. <math>I_{xx} = 3.37 \times 10^6 \text{ mm}^4</math>, <math>I_{yy} = 1.93 \times 10^6 \text{ mm}^4</math>, <math>I_{xy} = 1.50 \times 10^6 \text{ mm}^4</math></p> 	10M	CO5	L3

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B.Tech. (V Semester) Regular Examinations

**23CE08-DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**

(CE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define and write partial safety factor for steel and concrete.	2 M	CO1	L1
(b)	Find out the constants K, J, Q for M25 and Fe 500.	2 M	CO1	L2
(c)	When Doubly reinforced sections are used?	2 M	CO1	L2
(d)	What is meant by Neutral axis?	2 M	CO1	L1
(e)	What is meant by "Design shear strength of Concrete"?	2 M	CO1	L1
(f)	Explain the bond stress.	2 M	CO1	L2
(g)	What is meant by bi-axial bending of columns?	2 M	CO1	L1
(h)	What is meant by Safe Bearing Capacity?	2 M	CO1	L1
(i)	Why is corner reinforcement provided in two way slabs?	2 M	CO1	L1
(j)	How is the depth of the stair slab determined?	2 M	CO1	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Define under reinforced ,over reinforced and balanced sections with neat sketches.	5 M	CO1	L2
(b)	Derive the Stress-block parameters.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Differentiate between working stress method and limit state method.	5 M	CO1	L2
(b)	Explain the design principles of working stress method.	5 M	CO1	L2
4.	Design the reinforcement for a doubly reinforced concrete beam 300 mm wide and 400 mm deep of to resist a factored moment of 150 kN-m, use M25 grade concrete and Fe 500 steel.	10 M	CO2	L4
<b>(OR)</b>				
5.	Determine the Moment of Resistance of T –beam as given in data. Width of Flange = 1200mm, width of Web = 300mm, Depth of flange = 100mm, Effective depth of the section = 560mm, Ast = 6 - # 28mm Use M20 & Fe415 grades.	10M	CO2	L3
6.	An R.C.C beam 230 mm wide and 450 mm depth is reinforced with 4-16mm dia of grade Fe 415 on tension side. If design shear force is 60 kN. Design the shear reinforcement of beam by using vertical stirrups only. Assume the grade of concrete used is M 20.	10M	CO3	L4
<b>(OR)</b>				
7.	A rectangular reinforced concrete beam of size 300 mm × 600 mm overall depth is subjected to an ultimate moment of 75 kNm, a factored shear force of 90 kN and a factored torsional moment of 25 kNm. Design the longitudinal and transverse reinforcement. Sketch the reinforcement details. Use M 20 concrete and Fe 415 steel.	10M	CO3	L4
8.	An R C rectangular column of size 230 mm × 300 mm is reinforced with 4bars of 20 mm $\phi$ provided one at each corner with an effective cover of 60 mm. Examine the safety of the column. If it is subjected to Pu = 300kN. Mux = 30 kNm. Assume M20 concrete and Fe415 grade steel.	10M	CO4	L3
<b>(OR)</b>				
9.	Design an isolated square footing for a column of size 300 mm × 300 mm carrying a factored axial load of 800 kN. Safe bearing capacity of the soil is 100 kN/m <sup>2</sup> . Use M25 Concrete and Fe415 grade steel.	10M	CO4	L4
10.	Design a reinforced concrete slab 4m x 5m simply supported on all the four sides subjected to a live load of 4kN/m <sup>2</sup> . Use M25 concrete and Fe 415 steel. Assume that the corners of the slab are held down.	10M	CO5	L4
<b>(OR)</b>				
11.	Design a RC slab for a room having inside dimensions 3 m x 7 m. The thickness of supporting wall is 300 mm. The L.L on the slab may be taken as 2 kN/m <sup>2</sup> . Assume slab is simply supported at the ends. Use M20 and Fe-415 grade materials.	10M	CO5	L4

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B.Tech. (V Semester) Regular Examinations

**23AM02-INFORMATION RETRIEVAL SYSTEMS**  
(CSE(AI&ML))

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List out the major objectives of an Information Retrieval System.	2 M	CO1	L1
(b)	Differentiate between Information Retrieval Systems and Database Management Systems.	2 M	CO1	L2
(c)	What is the role of algorithms in improving retrieval performance?	2 M	CO1	L1
(d)	Define inverted files and list their key components.	2 M	CO2	L1
(e)	What is a signature file? Give a relevant use-case.	2 M	CO2	L2
(f)	Explain the concept of lexical analysis in Information Retrieval.	2 M	CO3	L2
(g)	What is the purpose of a PAT array?	2 M	CO3	L1
(h)	What is stemming, and why is it important in IR?	2 M	CO4	L2
(i)	Define a thesaurus. How does it enhance query expansion?	2 M	CO4	L1
(j)	List the key steps in the Boyer–Moore string searching algorithm.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2.	Discuss the relationship between Information Retrieval and other types of Information Systems with suitable examples.	10 M	CO1	L2
<b>(OR)</b>				
3(a)	Explain the importance of evaluation criteria in IR systems and describe any two performance metrics used.	5 M	CO1	L2
(b)	Write short notes on the role of data structures such as linked lists and trees in IR applications.	5 M	CO1	L2
4(a)	What are the main challenges in implementing inverted files in dynamic document collections?	5 M	CO2	L1
(b)	Explain the significance of compression in signature files and its effect on retrieval time.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Discuss the advantages and disadvantages of signature files compared to inverted files.	5 M	CO2	L2
(b)	Describe how compression techniques are applied to signature files.	5 M	CO2	L2
6(a)	Describe the process of lexical analysis and its contribution to building IR indices.	5 M	CO3	L2
(b)	What is the function of stoplists in improving retrieval accuracy? Provide an example.	5 M	CO3	L1
<b>(OR)</b>				
7(a)	What is the role of stop lists in indexing? How are they generated?	5 M	CO3	L2
(b)	Discuss the differences between PAT Trees and PAT Arrays with suitable examples.	5 M	CO3	L2
8.	Explain various types of stemming algorithms and discuss their comparative performance.	10 M	CO4	L2
<b>(OR)</b>				
9(a)	Describe how thesaurus construction improves search precision in IR systems.	5 M	CO4	L2
(b)	Explain the major features that characterize an effective thesaurus.	5 M	CO4	L2
10.	Explain in detail the working of the Karp–Rabin string searching algorithm and discuss its efficiency.	10 M	CO5	L2
<b>(OR)</b>				
11(a)	Compare the Naive algorithm and Shift–Or algorithm for pattern matching.	5 M	CO5	L3
(b)	Write short notes on preprocessing in the Knuth–Morris–Pratt algorithm.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23EC08 -ANALOG AND DIGITAL IC APPLICATIONS**

(ECE)

Time : 3 hours

Max. Marks : 70

*Passing*  
*20/11/20*

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define an operational amplifier.	2 M	CO1	L1
(b)	Draw the integrator circuit using an op-amp.	2 M	CO1	L1
(c)	Define band pass filter.	2 M	CO2	L1
(d)	Write the applications of 555 timer.	2 M	CO2	L2
(e)	Define slew rate.	2 M	CO3	L1
(f)	What is the use of resolution?	2 M	CO3	L1
(g)	Define combinational circuit.	2 M	CO4	L1
(h)	Write the advantages of TTL.	2 M	CO4	L1
(i)	Define ROM.	2 M	CO5	L1
(j)	Define a flip-flop, register and a memory.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Briefly explain the ideal characteristics of an Op-amp.	5 M	CO1	L2
(b)	Discuss the operation of instrumentation amplifier.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Discuss the operation of Op-amp in non-inverting mode.	5 M	CO1	L2
(b)	Write the features of 723 regulators.	5 M	CO1	L2
4.	Discuss the operation of PLL with a block diagram and write its applications.	10M	CO2	L2
<b>(OR)</b>				
5(a)	Design a first order low pass filter by considering own parameters.	5M	CO2	L3
(b)	Write the differences between band pass and band reject filters.	5M	CO2	L2
6(a)	Discuss the operation of weighted resistor DAC.	5M	CO3	L2
(b)	Briefly explain about successive approximation ADC.	5M	CO3	L2
<b>(OR)</b>				
7(a)	Discuss the operation of inverted R2R DAC.	5M	CO3	L2
(b)	Describe the operation of dual slope ADC.	5M	CO3	L2
8(a)	Write short notes on code converters.	5M	CO4	L2
(b)	Discuss about priority encoder.	5M	CO4	L2
<b>(OR)</b>				
9.	Design a 16X1 multiplexer using Two 8X1 Multiplexer.	10M	CO4	L3
10(a)	Discuss the operation of D-flipflop.	5M	CO5	L2
(b)	Briefly explain different types of ROMs.	5M	CO5	L2
<b>(OR)</b>				
11(a)	Discuss about synchronous counters.	5M	CO5	L2
(b)	Differentiate combinational and sequential circuits.	5M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23EE10-POWER ELECTRONICS**

(EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are the conditions should be satisfied to turn-off the SCR?	2 M	CO1	L1
(b)	List the advantages of Voltage control devices.	2 M	CO1	L1
(c)	What are the advantages of bridge phase control rectifier than mid point?	2 M	CO2	L1
(d)	What is the effect of source inductance on output voltage in single phase rectifier?	2 M	CO2	L1
(e)	What is the input and output voltages of three phase full bridge rectifier?	2 M	CO3	L1
(f)	List the applications of AC voltage regulator.	2 M	CO3	L1
(g)	Define the duty cycle of a chopper.	2 M	CO4	L1
(h)	List the applications of a Boost converter.	2 M	CO4	L1
(i)	Mention two disadvantages of a half-bridge inverter.	2 M	CO5	L1
(j)	Which PWM generate the low harmonics either uni-polar or bi-polar.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Sketch and explain about the static characteristics of a thyristor.	5 M	CO1	L2
(b)	Discuss the features of RC firing circuit of SCR.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Briefly describe the characteristics of MOSFET.	5 M	CO1	L2
(b)	What are the components in snubber circuit? Discuss with neat diagram?	5 M	CO1	L1
4(a)	Discuss the operation of single phase half wave controlled converter with R load and derive the output voltage formula.	5 M	CO2	L2
(b)	Analyze the operation of single-phase semi converter with neat diagram and waveforms.	5 M	CO2	L3
<b>(OR)</b>				
5(a)	Derive the output voltage for single phase fully controlled bridge converter with RL load. Draw the voltage and current waveforms.	5 M	CO2	L3
(b)	Derive an expression for its output voltage in terms of supply voltage, source inductance load current etc. for the effect of source inductance on single phase full converter.	5 M	CO2	L3
6(a)	With a neat circuit and waveforms, explain the operation three phase half wave rectifier with RL load and derive the expression for average output voltage.	5 M	CO3	L2
(b)	Explain the operation of a single phase to single phase bridge type cyclo converter to step-down the output frequency for R load.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Discuss the operation of a three phase semi converter with neat voltage waveforms.	5 M	CO3	L3
(b)	With a neat circuit and waveforms, discuss the operation of single phase AC voltage regulator with RL load.	5 M	CO3	L2
8(a)	A Buck converter operates with the following parameters: Input voltage $V_{in}=48V$ , Duty cycle $D=0.4$ , Switching frequency $f=25$ kHz, Output inductance $L=200$ $\mu H$ , Output capacitance $C=1000$ $\mu F$ , Load resistance $R=10$ $\Omega$ Calculate: (i) Output voltage, (ii) Inductor current ripple $\Delta I_L$ (iii) Output voltage ripple $\Delta V_o$ .	5 M	CO4	L3
(b)	Discuss various control strategies of chopper.	5 M	CO4	L2
<b>(OR)</b>				
9(a)	In the continuous conduction mode of step down chopper, show that per unit ripple in the load current is maximum when duty cycle is equal to 0.5.	5 M	CO4	L3
(b)	Explain the operating principle of Buck-Boost chopper with a suitable diagram in CCM. Draw the voltage and current waveforms of chopper.	5 M	CO4	L2
10.	Describe in detail three phase inverter for 120-degree mode of operation, draw the voltage waveforms and equivalent circuits for a three phase six step 120-degree mode inverter with balanced star connected load.	10 M	CO5	L3
<b>(OR)</b>				
11(a)	Discuss the operation of PWM with Bipolar voltage switching of single phase full bridge inverter with neat circuit and waveforms	5 M	CO5	L2
(b)	Discuss principle of operation of single-phase full-bridge inverter with neat circuit diagram and wave forms.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23IT04-ADVANCED JAVA**

(IT)

Time : 3 hours

Max. Marks : 70

*20/11/20*

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define JDBC and explain its purpose in Java programming.	2 M	CO1	L2
(b)	Differentiate between Statement and Prepared Statement interfaces in JDBC.	2 M	CO1	L2
(c)	Explain the role of an Application Server in a J2EE environment.	2 M	CO2	L2
(d)	Why is J2EE preferred over traditional client-server architecture for enterprise applications?	2 M	CO2	L2
(e)	State any two differences between Generic Servlet and HttpServlet.	2 M	CO3	L2
(f)	What is the role of a Filter in the Servlet API?	2 M	CO3	L2
(g)	What are scripting elements in JSP? Name any two.	2 M	CO4	L2
(h)	Why are custom tags preferred over large JSP applications?	2 M	CO4	L2
(i)	Define Dependency Injection and explain why it is important.	2 M	CO5	L2
(j)	How does the Spring DAO layer improve database interaction?	2 M	CO5	L2
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Explain JDBC architecture in a detail, with a neat sketch.	5 M	CO1	L2
(b)	Write and explain JDBC program that connects to a database, executes a query.	5 M	CO1	L3
<b>(OR)</b>				
3(a)	Design and explain a CRUD application using JDBC.	5 M	CO1	L3
(b)	Examine a banking system where multiple users perform transactions simultaneously. Explain how you would implement transaction management in JDBC.	5 M	CO1	L3
4.	The HTTP protocol is stateless. Explain how J2EE overcomes this limitation through technologies such as sessions, cookies, and hidden fields. Provide a use-case example demonstrating session persistence.	10 M	CO2	L3
<b>(OR)</b>				
5(a)	List and explain the types of servers in J2EE Environment.	5 M	CO2	L2
(b)	Explain the difference between Web Containers and Application Containers.	5 M	CO2	L2
6(a)	Explain the Servlet Life Cycle with a neat labeled diagram.	5 M	CO3	L2
(b)	Describe how servlet configuration is achieved using the deployment descriptor.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Compare any two types of servlets.	5 M	CO3	L2
(b)	Write a servlet that demonstrates the use of session tracking with cookies.	5 M	CO3	L3
8(a)	Explain the JSP life cycle in detail with a neat sketch.	5 M	CO4	L2
(b)	What is an exception. How you handle the exceptions? Discuss it briefly.	5 M	CO4	L3
<b>(OR)</b>				
9.	Design a JSP-based CRUD application for managing employee data.	10 M	CO4	L3
10(a)	Describe the Spring MVC architecture.	5 M	CO5	L2
(b)	Explain the Spring AOP module, briefly.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Explain the life cycle of a Spring Bean in detail.	5 M	CO5	L2
(b)	Discuss the scope of database transaction management.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23ME10-MACHINE TOOLS AND METROLOGY  
(ME)**

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define tool signature.	2 M	CO1	L1
(b)	What is the function of a tailstock in a lathe?	2 M	CO1	L1
(c)	What is the purpose of a quick return mechanism in shaping machine?	2 M	CO2	L1
(d)	Write two differences between drilling and boring.	2 M	CO2	L1
(e)	List any two operations performed on a milling machine.	2 M	CO3	L1
(f)	Differentiate between honing and lapping.	2 M	CO3	L1
(g)	List any two types of linear measuring instruments.	2 M	CO4	L2
(h)	Define limit, fit, and tolerance.	2 M	CO4	L1
(i)	State two merits of the toolmaker's microscope.	2 M	CO5	L2
(j)	Define surface roughness.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2	Describe the nomenclature and tool signature of a single-point cutting tool.	10 M	CO1	L2
<b>(OR)</b>				
3(a)	Compare at least 5 lathe operations with neat sketches. How do attachments enhance the functionality of lathes?	5 M	CO1	L2
(b)	Discuss the Thread cutting operation on a lathe.	5 M	CO1	L2
4.	Explain the quick return mechanism used in a shaper machine with a neat diagram.	10 M	CO2	L2
<b>(OR)</b>				
5(a)	Distinguish between shaper and slotter.	5M	CO2	L2
(b)	Explain the various operations performed on a drilling machine.	5M	CO2	L2
6(a)	What factors influence the selection of a grinding wheel?	5M	CO3	L1
(b)	Describe the types of abrasives and bonds used in grinding wheels.	5M	CO3	L2
<b>(OR)</b>				
7.	Describe in detail the indexing methods used in milling.	10M	CO3	L2
8(a)	Differentiate between unilateral and bilateral tolerance systems with neat sketches.	5 M	CO4	L2
(b)	Explain Taylor's principle and discuss the design of Go and No-Go gauges.	5 M	CO4	L2
<b>(OR)</b>				
9.	Explain in detail the hole basis and shaft basis systems. Discuss their industrial applications and selection criteria.	10 M	CO4	L2
10(a)	Explain the working principle and applications of a spirit level in angle measurement.	5M	CO5	L2
(b)	Explain the procedure for measuring an angle using a bevel protractor.	5M	CO5	L2
<b>(OR)</b>				
11(a)	State the principle and applications of an autocollimator.	5M	CO5	L2
(b)	Describe the numerical assessment of surface finish. Explain how a Profilograph and Talysurf are used for this purpose, with relevant ISI symbols.	5M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23AM03-PRINCIPLES OF MACHINE LEARNING**

(AI&amp;DS)

Time : 3 hours

Max. Marks :70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the role of feature engineering in the ML pipeline?	2 M	CO1	L1
(b)	Differentiate between Training Data and Test Data.	2 M	CO1	L2
(c)	Explain the role of the parameter k in K-NN classification.	2 M	CO2	L2
(d)	List any two non-metric similarity functions.	2 M	CO2	L1
(e)	Define Information Gain used for selecting attributes in a Decision Tree.	2 M	CO3	L1
(f)	Explain the concept of Entropy as used in Decision Tree.	2 M	CO3	L2
(g)	What is the role of Backpropagation in Neural Networks?	2 M	CO4	L1
(h)	How does Linear SVM differ from Non-Linear SVM?	2 M	CO4	L2
(i)	Explain how Sequential Ensemble methods differ from Parallel Ensemble methods.	2 M	CO5	L2
(j)	Define the Q-value in the context of Q-Learning.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Explain the complete Machine Learning pipeline with a neat flowchart.	5 M	CO1	L2
(b)	Compare Learning by Rote and Learning by Induction with suitable examples.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Discuss the concept of Hypothesis Space in Machine Learning.	5 M	CO1	L2
(b)	Classify the types of Machine Learning and describe the key characteristics and applications of each type.	5 M	CO1	L4
4(a)	Describe the working of the K-Nearest Neighbor (KNN) classifier and explain how it classifies new data points.	5 M	CO2	L2
(b)	Explain the concept of Proximity Measures in Machine Learning.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Discuss the Radius Distance Nearest Neighbor (RNN) algorithm and explain how it differs from the standard K-Nearest Neighbor (KNN) method.	5 M	CO2	L2
(b)	How does KNN Regression work? Explain the differences between KNN Regression and KNN Classification.	5 M	CO2	L2
6(a)	Explain the working of a Decision Tree for classification with a suitable example, and show how the best attribute splits are selected using a chosen criterion with calculations.	5 M	CO3	L2
(b)	Define the Bias-Variance Trade-off and explain its significance in machine learning models.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Describe the working of Random Forests and explain how they improve the accuracy of Decision Tree models.	5 M	CO3	L2
(b)	Discuss the concept of Class Conditional Independence and its significance in Naive Bayes classification.	5 M	CO3	L2
8(a)	What are the differences between Logistic Regression and Linear Regression?	5 M	CO4	L2
(b)	Explain the role of activation functions in Multi-Layer Perceptrons (MLPs).	5 M	CO4	L2
<b>(OR)</b>				
9(a)	Describe how SVM separates classes using a Hyperplane.	5 M	CO4	L2
(b)	How does the Backpropagation algorithm work, and how is it used to train Multi-Layer Perceptrons (MLPs)?	5 M	CO4	L3
10(a)	Define Ensemble Learning and explain its purpose in Machine Learning.	5 M	CO5	L2
(b)	What is Gradient Boosting and how does it make predictions better?	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Describe the main components of a Reinforcement Learning system.	5 M	CO5	L2
(b)	How does Q-Learning help an Agent choose the best action?	5 M	CO5	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23AE08-GAS DYNAMICS**

(ASE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Write the expression for stagnation temperature in terms of static temperature and Mach number.	2 M	CO1	L1
(b)	Differentiate between subsonic, sonic, and supersonic flows based on Mach number.	2 M	CO1	L1
(c)	Define and critical pressure ratio.	2 M	CO2	L2
(d)	State the area-Mach number relation.	2 M	CO2	L2
(e)	Write the Hugoniot equation.	2 M	CO3	L2
(f)	Define Mach angle and Mach wave.	2 M	CO3	L2
(g)	Write the energy equation for adiabatic flow with friction.	2 M	CO4	L1
(h)	Mention the changes in Mach number along the Fanno line.	2 M	CO4	L1
(i)	Define critical Mach number.	2 M	CO5	L1
(j)	Define drag-divergence Mach number.	2 M	CO5	L2
<b>All questions carry equal marks</b>		<b>Marks</b>	<b>CO</b>	<b>BL</b>
2	A supersonic flow of air at Mach 3 expands isentropically from a stagnation pressure of 1 MPa and stagnation temperature of 400 K. Determine the static pressure, static temperature, and density.	10 M	CO1	L3
<b>(OR)</b>				
3	Apply the energy equation for compressible flow to determine the stagnation temperature, pressure, and density of air when it is accelerated from rest to a Mach.	10 M	CO1	L3
4	In a one-dimensional steady isentropic flow through a nozzle, the area ratio $A/A^*=2$ . Determine the Mach number at this section for air ( $\gamma=1.4$ ) for both subsonic and supersonic cases.	10 M	CO2	L3
<b>(OR)</b>				
5	Air enters a diffuser with a Mach number of 0.8, static pressure 100 kPa, and static temperature 290 K. If the flow is isentropically decelerated to Mach 0.2, determine the exit pressure, temperature, and stagnation pressure ratio. Take $\gamma=1.4$ .	10 M	CO2	L3
6	Air at Mach 2.0, static pressure 100 kPa, and static temperature 300 K encounters a normal shock. Determine: (i) Mach number, (ii) pressure, (iii) temperature, and (iv) density behind the shock. Take $\gamma=1.4$ .	10 M	CO3	L3
<b>(OR)</b>				
7	Air at Mach 1.5, static pressure 100 kPa, and static temperature 300 K expands around a corner with turning angle $15^\circ$ . Determine: (i) the exit Mach number, (ii) exit pressure, and (iii) exit temperature. Take $\gamma=1.4$ .	10 M	CO3	L3
8	Air enters a constant area duct at $M = 0.5$ , $P = 150$ kPa, and $T = 300$ K. The duct has $L/D = 50$ and $f = 0.02$ . Determine: (i) the exit Mach number, (ii) static pressure, and (iii) stagnation pressure drop.	10 M	CO4	L3
<b>(OR)</b>				
9	Air at Mach 2.0, $P = 100$ kPa, $T = 300$ K passes through a duct where heat is added to reduce Mach number to 1.5. Calculate: (i) the amount of heat added per unit mass, (ii) exit pressure, and (iii) exit temperature.	10 M	CO4	L3
10	Derive the nonlinear velocity potential equation for compressible flow.	10 M	CO5	L3
<b>(OR)</b>				
11(a)	Determine the minimum coefficient of pressure for a wing if the critical Mach number is (i) 0.3 and (ii) 0.4.	5 M	CO5	L3
(b)	For a given airfoil, the critical Mach number is 0.8. Calculate the ratio of minimum pressure on the airfoil to freestream pressure when freestream Mach number is 0.8.	5 M	CO5	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist.:: A.P.

B.Tech. (V Semester) Regular Examinations

**23CE09-ENGINEERING HYDROLOGY**

(CE)

Time : 3 hours

Max. Marks :70

*Answered  
22/11/25*

Q.No	Compulsory Question	Marks	CO	BL												
1(a)	Highlight the hydrological data required for proper analysis of Water Resources Projects.	2 M	CO1	L1												
(b)	Define Double mass curve.	2 M	CO1	L1												
(c)	Draw the shape of infiltration capacity curve.	2 M	CO1	L1												
(d)	What are the factors affecting the process of infiltration?	2 M	CO1	L1												
(e)	What is a flow mass curve?	2 M	CO3	L1												
(f)	Define instantaneous unit hydrograph (IUH).	2 M	CO3	L1												
(g)	What is channel routing and reservoir routing?	2 M	CO3	L1												
(h)	Define Standard Project Flood (SPF).	2 M	CO3	L1												
(i)	Define the terms: Porosity, Specific Yield.	2 M	CO3	L1												
(j)	Define a well. List any two types of wells used in ground water extraction.	2 M	CO3	L1												
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>												
2(a)	Explain the computation of average precipitation by various methods.	5 M	CO1	L2												
(b)	The isohyets due to a storm in a catchment were drawn and the area of the catchment bounded by isohyets were tabulated as below.	5 M	CO2	L3												
	<table border="1"> <thead> <tr> <th>Isohyets (cm)</th> <th>Area (km<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>18.0-16.0</td> <td>70</td> </tr> <tr> <td>16.0-14.0</td> <td>120</td> </tr> <tr> <td>14.0-12.0</td> <td>80</td> </tr> <tr> <td>12.0-10.0</td> <td>190</td> </tr> <tr> <td>10.0-8.0</td> <td>40</td> </tr> </tbody> </table>				Isohyets (cm)	Area (km <sup>2</sup> )	18.0-16.0	70	16.0-14.0	120	14.0-12.0	80	12.0-10.0	190	10.0-8.0	40
Isohyets (cm)	Area (km <sup>2</sup> )															
18.0-16.0	70															
16.0-14.0	120															
14.0-12.0	80															
12.0-10.0	190															
10.0-8.0	40															
<b>(OR)</b>																
3(a)	Describe the different methods used for the presentation of rainfall data.	5 M	CO1	L2												
(b)	Explain the hydrologic cycle and describe its major components with a neat and labeled sketch.	5 M	CO1	L2												
4.	Explain evaporation in detail. Discuss the factors affecting it and techniques for controlling evaporation losses.	10 M	CO1	L2												
<b>(OR)</b>																
5(a)	The rates of rainfall for successive 30-minute periods of a 4-hour storm are: 4.0, 5.5, 7.0, 6.2, 5.0, 3.8, 3.5, 5.0 cm/hr. Taking the $\Phi$ -index as 3.5 cm/hr, compute: (i) total rainfall, (ii) total rainfall excess, and (iii) Cumulative excess $W_i$ .	5M	CO2	L3												
(b)	Explain in detail the measurement of evapotranspiration using (i) Lysimeters and (ii) Field Plot method.	5M	CO1	L2												
6(a)	Explain the various methods used for base flow separation from a hydrograph.	5M	CO3	L2												

**23CE09-ENGINEERING HYDROLOGY**

(b)	Given the ordinates of a 4-hour unit hydrograph as below and derive the ordinates of a 12-hour unit hydrograph for the same catchment using the superposition method.	5M	CO4	L3																						
					<table border="1"> <tr> <td>Time (Hours)</td> <td>0</td> <td>4</td> <td>8</td> <td>12</td> <td>16</td> <td>20</td> <td>24</td> <td>28</td> <td>32</td> <td>36</td> <td>40</td> <td>44</td> </tr> <tr> <td>Ordinate Of a 4-hour UH (m<sup>3</sup>/s per cm)</td> <td>0</td> <td>20</td> <td>80</td> <td>130</td> <td>150</td> <td>130</td> <td>90</td> <td>52</td> <td>27</td> <td>15</td> <td>5</td> <td>0</td> </tr> </table>	Time (Hours)	0	4	8	12	16	20	24	28	32	36	40	44	Ordinate Of a 4-hour UH (m <sup>3</sup> /s per cm)	0	20	80	130	150	130	90
Time (Hours)	0	4	8	12	16	20	24	28	32	36	40	44														
Ordinate Of a 4-hour UH (m <sup>3</sup> /s per cm)	0	20	80	130	150	130	90	52	27	15	5	0														
<b>(OR)</b>																										
7(a)	Define a Unit Hydrograph. Describe the procedure involved in the construction of a Unit Hydrograph and discuss the basic assumptions of this theory.	5M	CO3	L2																						
(b)	The peak of a flood hydrograph due to a 3-hour duration isolated storm in a catchment is 350 m <sup>3</sup> /sec. The total rainfall depth recorded is 6.5 cm. Assuming an average infiltration loss of 0.4 cm/h and a constant base flow of 25 m <sup>3</sup> /s, estimate the peak of the 3-hour unit hydrograph of this catchment.	5M	CO4	L3																						
8(a)	Explain flood control methods and management in detail.	5M	CO3	L2																						
(b)	What is meant by 'flood routing through reservoirs? Explain the step-wise procedure adopted for flood routing by Puls Method.	5M	CO3	L2																						
<b>(OR)</b>																										
9.	Calculate the peak of the outflow hydrograph in a river reach using Muskingum method given the following inflow hydrograph. Take C <sub>0</sub> =0.038, C <sub>1</sub> =0.467, C <sub>2</sub> = 0.495 and the starting value of outflow hydrograph as 15 m <sup>3</sup> /s.	10M	CO4	L3																						
					<table border="1"> <tr> <td>Time (Hours)</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>Inflow (m<sup>3</sup>/s)</td> <td>10</td> <td>20</td> <td>40</td> <td>60</td> <td>50</td> <td>40</td> <td>30</td> <td>20</td> <td>10</td> </tr> </table>	Time (Hours)	0	1	2	3	4	5	6	7	8	Inflow (m <sup>3</sup> /s)	10	20	40	60	50	40	30	20	10	
Time (Hours)	0	1	2	3	4	5	6	7	8																	
Inflow (m <sup>3</sup> /s)	10	20	40	60	50	40	30	20	10																	
10(a)	Distinguish between (i) Aquifer and Aquifuge (ii) Groundwater and perched groundwater.	5M	CO3	L2																						
(b)	A 30 cm well completely penetrates an unconfined aquifer of depth 40 m. After a long period of pumping at a steady state of 1580 lpm, the drawdowns in two observation wells at radial distances 25 m and 75 m from the pumping well were found to be 3.5 m and 2.0 m respectively. (i) Determine the transmissivity of the aquifer. (ii) Determine the draw down at the pumping well.	5M	CO5	L3																						
<b>(OR)</b>																										
11(a)	Detail Dupit's assumptions for obtaining general equations governing groundwater flow.	5M	CO3	L2																						
(b)	Derive an expression for the steady state discharge of a well fully penetrating into a confined aquifer.	5M	CO3	L2																						

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L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23CS07-COMPUTER NETWORKS**

(CSE,CSE(AI&amp;ML) and IT)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the purpose of the OSI Reference Model?	2 M	CO1	L1
(b)	Compare star and bus topologies.	2 M	CO1	L2
(c)	What services does the Data Link Layer provide to the Network Layer?	2 M	CO2	L2
(d)	What is the difference between Go-back-N and Selective repeat protocols?	2 M	CO2	L2
(e)	What is the purpose of Media Access Control?	2 M	CO3	L2
(f)	Compare Fast Ethernet and Gigabit Ethernet.	2 M	CO3	L2
(g)	What is the optimality principle in routing?	2 M	CO4	L1
(h)	Compare distance vector and link state routing algorithms.	2 M	CO4	L2
(i)	What is the purpose of the Length field in the UDP header?	2 M	CO5	L1
(j)	Compare local(TELNET) and remote login.	2 M	CO5	L2
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Describe the differences between TCP/IP and OSI Reference Models.	5 M	CO1	L2
(b)	Discuss the characteristics and applications of twisted-pair cable, coaxial cable, and fiber optic cable.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe the characteristics and applications of LAN, MAN, and WAN networks.	5 M	CO1	L2
(b)	Explain the Physical Layer and its role in data transmission in detail.	5 M	CO1	L2
<b>(OR)</b>				
4(a)	Describe the various framing methods and their advantages with suitable examples.	5 M	CO2	L3
(b)	Discuss the Simplex protocol for Noisy Channel and its error handling mechanisms.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Compare and contrast CRC and checksum error detection methods with suitable examples.	5 M	CO2	L3
(b)	Explain the Sliding Window Protocol and its working mechanism, including the sender and receiver windows.	5 M	CO2	L2
<b>(OR)</b>				
6(a)	Explain the ALOHA protocol in detail with the help of a diagram.	5 M	CO3	L2
(b)	Describe the Ethernet protocol and its frame format with the help of a neat sketch.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Explain the Frequency Division Multiple Access (FDMA) technique and compare its efficiency with other multiple access techniques.	5 M	CO3	L2
(b)	Explain the 10 Gigabit Ethernet standard and its applications.	5 M	CO3	L2
<b>(OR)</b>				
8(a)	Explain the store and forward packet switching mechanism and its role in the Network Layer.	5 M	CO4	L2
(b)	Describe the hierarchical routing approach and its benefits with the help of an example.	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Explain the implementation of virtual circuit and datagram networks and highlight their advantages and disadvantages.	5 M	CO4	L2
(b)	Describe the leaky bucket and token bucket traffic control algorithms and highlight their differences.	5 M	CO4	L2
<b>(OR)</b>				
10(a)	Explain the role of port numbers in transport layer protocols and discuss how they enable multiplexing and demultiplexing?	5 M	CO5	L2
(b)	Explain the architecture of an e-mail system with the help of a neat diagram.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Describe the process of connection termination in TCP. Compare it with connection establishment.	5 M	CO5	L2
(b)	Differentiate between HTTP persistent and non-persistent connections. Discuss their advantages and disadvantages.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23EC09-DIGITAL COMMUNICATIONS**

(ECE)

*Boorjoo*  
*22/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are the advantages of digital communication over analog communication?	2 M	CO1	L1
(b)	Define companding and what is u-law.	2 M	CO1	L1
(c)	How to avoid slope over distortion?	2 M	CO1	L2
(d)	List any two comparisons between PCM and DM.	2 M	CO2	L1
(e)	Draw the constellation diagram for QPSK.	2 M	CO2	L2
(f)	Draw the waveform of a digital sequence "1011" using PSK.	2 M	CO2	L2
(g)	Write the expression for probability of error in QPSK.	2 M	CO3	L1
(h)	What is a matched filter?	2 M	CO3	L1
(i)	List the properties of linear block codes.	2 M	CO4	L1
(j)	Define constraint length and code rate of convolution code.	2 M	CO4	L1
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Explain non-uniform quantization? Explain A-law and $\mu$ -law companding techniques.	5 M	CO1	L2
(b)	With a neat sketch explain the basic elements of a digital communication system.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Explain the term 'Quantization'. Draw the characteristics of uniform quantizers.	5 M	CO1	L2
(b)	Illustrate the principle of Time Division Multiplexing (TDM) with a block diagram.	5 M	CO1	L3
4.	Derive an expression for signal to quantization noise ratio for a PCM system which employs linear quantization technique. Given that input to the PCM system is a sinusoidal signal.	10 M	CO1	L3
<b>(OR)</b>				
5(a)	Describe the process of sampling, quantization, and coding in PCM.	5M	CO1	L2
(b)	List any 4 Comparisons between PCM, ADM and DM Systems.	5M	CO1	L1
6(a)	Compare BASK, BFSK and BPSK modulation schemes.	5M	CO2	L2
(b)	Identify the advantages and disadvantages of M-ary signalling over binary signaling.	5M	CO2	L1
<b>(OR)</b>				
7(a)	Given a carrier frequency of 10 kHz, sketch the BFSK signal for the bit sequence "110010". Assume $\Delta f=2$ kHz.	5M	CO2	L4
(b)	Draw the waveform of a digital sequence "1011" using ASK and explain.	5M	CO2	L4
8(a)	Compare the BER performance of M-ary FSK and M-ary PSK.	5M	CO3	L3
(b)	Derive an expression for the probability of error for BPSK.	5 M	CO3	L3
<b>(OR)</b>				
9.	Develop the expression for signal to noise ratio of a matched filter.	10 M	CO3	L4
10(a)	Apply the matrix description of Linear Block Code to find the parity check bits for the message 1010.	5M	CO4	L3
(b)	Explain the working principle of the Viterbi algorithm in decoding.	5M	CO4	L2
<b>(OR)</b>				
11(a)	Derive the condition for single-bit error correction in block codes.	5M	CO4	L3
(b)	Encode the message vector $m = [1\ 0\ 1\ 1]$ using the (7,4) Hamming code.	5M	CO4	L4

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L.B.Reddy Nagar :: Mylavaram - 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23EE11-DIGITAL CIRCUITS**

(EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Draw the logic circuits for the expression $A\bar{C} + C$ using basic gates and $AB + \bar{B}$ using NAND gates.	2M	CO1	L2
(b)	Distinguish between combinational and sequential logic circuits.	2M	CO1	L1
(c)	A 4-to-1 MUX has inputs 0, 1, 1, 0. If the select lines are $S_1S_0 = 10$ , what is the output?	2M	CO1	L2
(d)	Define volatile and non-volatile memory with one example each.	2M	CO1	L1
(e)	What is race around condition? How is it eliminated?	2M	CO2	L2
(f)	What is a flip-flop?	2M	CO2	L1
(g)	Define state assignment and its importance in sequential circuit design.	2M	CO3	L1
(h)	Differentiate between Moore and Mealy machines with an example.	2M	CO3	L1
(i)	Compare TTL and CMOS logic families in terms of power consumption.	2M	CO4	L1
(j)	Write short notes on DTL.	2M	CO4	L2
<b>All questions carry equal marks</b>				
Q.No		Marks	CO	BL
2(a)	Design and explain the working of a full subtractor.	5M	CO1	L3
(b)	Simplify the Boolean function using a 4-variable K-map: $F(A,B,C,D) = \sum m(0,2,5,7,8,10,13)$ with don't-care: $d(1,3,15)$	5M	CO1	L2
<b>(OR)</b>				
3(a)	Simplify the Boolean function using a 4-variable K-map: $F(A,B,C,D) = \sum m(1,3,7,11,15)$ with don't-care: $d(0,2,5)$	5M	CO1	L3
(b)	How can a full adder be constructed with two half adders and one OR gate?	5M	CO1	L2
4(a)	Implement the following Boolean function using $8 \times 1$ multiplexer: $F(A,B,C,D) = \sum m(1,3,4,11,12,13,14,15)$	5M	CO1	L3
(b)	Draw the logic diagram of binary to octal decoder and explain the working in detail.	5M	CO1	L2
<b>(OR)</b>				
5(a)	Design and explain 1 of 8 demultiplexer.	5M	CO1	L3
(b)	How do you re-assign the following function with one 8 to 1 multiplexer. $F(A,B,C,D) = \sum m(0,1,4,5,6,7,9,11,15)$	5M	CO1	L3
6(a)	Explain the working of a 4-bit synchronous binary counter and draw its timing diagram.	5M	CO2	L2
(b)	Explain the working of a master slave JK flip flop.	5M	CO2	L2
<b>(OR)</b>				
7(a)	Draw a 4-bit SISO & PIPO shift register and briefly explain.	5M	CO2	L2
(b)	Explain the working of MOD-11 asynchronous counter.	5M	CO2	L2
8(a)	Draw the state diagram of Moore type to detect a serial input sequence of 101.	5M	CO3	L3

**23EE11-DIGITAL CIRCUITS**

(b)	Perform state reduction for the given state table and show the minimized equivalent table.	<table border="1"> <thead> <tr> <th rowspan="2">Present state</th> <th colspan="2">Next state</th> <th colspan="2">Output</th> </tr> <tr> <th>X = 0</th> <th>X = 1</th> <th>X = 0</th> <th>X = 1</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>b</td> <td>c</td> <td>0</td> <td>0</td> </tr> <tr> <td>b</td> <td>d</td> <td>e</td> <td>1</td> <td>0</td> </tr> <tr> <td>c</td> <td>c</td> <td>d</td> <td>0</td> <td>1</td> </tr> <tr> <td>d</td> <td>a</td> <td>d</td> <td>0</td> <td>0</td> </tr> <tr> <td>e</td> <td>c</td> <td>d</td> <td>0</td> <td>1</td> </tr> </tbody> </table>				Present state	Next state		Output		X = 0	X = 1	X = 0	X = 1	a	b	c	0	0	b	d	e	1	0	c	c	d	0	1	d	a	d	0	0	e	c	d	0	1	5M	CO3	L3
		Present state	Next state		Output																																					
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b	d	e	1	0																																						
c	c	d	0	1																																						
d	a	d	0	0																																						
e	c	d	0	1																																						

**(OR)**

9(a)	Explain the procedure for designing a synchronous sequential circuit. Illustrate the steps with an example.	5M	CO3	L2
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(b)	Construct the state table and state diagram for the given circuit. Identify whether the circuit represents a Moore model or a Mealy model.	5M	CO3	L3

10(a)	Explain the following terms with neat diagrams: (i) Logic levels (ii) Noise margin (iii) Propagation delay.	5M	CO4	L2
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(b)	Draw the circuit of a Transistor-Transistor Logic (TTL) NAND gate and explain its operation.	5M	CO4	L2
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**(OR)**

11(a)	Describe the operation of an Emitter Coupled Logic (ECL) gate. Why is ECL considered the fastest logic family?	5M	CO4	L2
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(b)	With circuit schematic, explain the operation of two input TTL NOR gate.	5M	CO4	L2
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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23ME11-THERMAL ENGINEERING**

(ME)

*22/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List any four main components of an IC engine.	2M	CO1	L1
(b)	Define Octane Number and Cetane Number.	2M	CO1	L1
(c)	Mention the function of a condenser in a steam power plant.	2M	CO2	L1
(d)	Show the difference between fire tube and water tube boilers.	2M	CO2	L1
(e)	List the types of nozzles used in steam turbines	2M	CO3	L1
(f)	State two functions of a condenser in a steam power plant	2M	CO3	L1
(g)	Define diagram efficiency.	2M	CO4	L1
(h)	Write the condition for maximum efficiency of an Impulse steam turbine.	2M	CO4	L1
(i)	What is the function of an intercooler in a multistage compressor?	2M	CO5	L1
(j)	Mention two differences between axial and centrifugal compressors.	2M	CO5	L1
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Describe the procedure for conducting a heat balance test on an internal combustion engine.	5M	CO1	L2
(b)	Compare the working principles of 2-stroke and 4-stroke SI and CI engines with neat sketches.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Explain the stages of combustion in spark ignition (SI) engines with suitable diagrams.	5M	CO1	L2
(b)	A four-cylinder four-stroke diesel engine develops a brake power of 100 kW at 1500 rpm. The brake thermal efficiency is 30%. Find the fuel consumption rate if the calorific value of the fuel is 42,000 kJ/kg.	5M	CO1	L3
4.	Explain the methods used to improve the efficiency of the Rankine cycle, such as reheating and regeneration, with suitable diagrams.	10 M	CO2	L2
<b>(OR)</b>				
5(a)	Classify boilers and describe the construction and working of a Benson high pressure boiler with a neat sketch.	5M	CO2	L2
(b)	A steam power plant operates on a Rankine cycle with steam entering the turbine at 30 bar and 400°C and leaving the condenser at 0.05 bar. Determine a) thermal efficiency b) Specific steam consumption.	5M	CO2	L3
6(a)	Classify steam nozzles and describe their applications in steam turbines and jet propulsion systems.	5M	CO3	L2
(b)	Derive the critical pressure ratio for the condition of maximum discharge through a steam nozzle.	5M	CO3	L3
<b>(OR)</b>				
7(a)	Compare jet condensers and surface condensers in terms of construction, operation, efficiency, and suitability for power plants.	5M	CO3	L2
(b)	The outlet and inlet temperatures of cooling water to a condenser are 37.5°C and 30°C respectively. If the vacuum in the barometer is 706 mm of mercury with barometer reading 760 mm determine condenser efficiency.	5M	CO3	L3
8(a)	Describe the method of velocity compounding in a steam turbine and explain how it helps to reduce the speed of the rotor.	5M	CO4	L2
(b)	In a De-Laval turbine steam issues from the nozzle with a velocity of 1200m/s. The nozzle angle is 20°, the blade velocity is 400 m/s, and the inlet and outlet angles of blades are equal. The mass of steam flowing through the turbine per hour is 1000 kg. Calculate (i) Blade angles (ii) power developed.	5M	CO4	L3
<b>(OR)</b>				
9.	Describe the methods used to improve the efficiency of gas turbine cycles, such as intercooling, reheating, and regeneration, with suitable diagrams.	10M	CO4	L2
10(a)	What do you mean by multi-stage compression? State its advantages.	5M	CO5	L2
(b)	Derive an expression for the work done in a single-stage reciprocating air compressor.	5M	CO5	L3
<b>(OR)</b>				
11(a)	Explain the working principle of a rotary vane compressor with a neat sketch.	5M	CO5	L2
(b)	Explain the causes of surging and choking in axial and centrifugal compressors.	5M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23AD05-DATA VISUALIZATION**

(AI&amp;DS)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is meant by information overload?	2 M	CO1	L1
(b)	Define data visualization and mention its purpose.	2 M	CO1	L2
(c)	Mention any two types of mappings used in visual representation.	2 M	CO2	L1
(d)	What is the use of the visualization reference model?	2 M	CO2	L1
(e)	List two examples of text visualization techniques	2 M	CO3	L2
(f)	What are the main types of visualization systems?	2 M	CO3	L1
(g)	Define cluster visualization.	2 M	CO4	L1
(h)	What is meant by metaphorical visualization?	2 M	CO4	L1
(i)	What is GIS and its purpose in visualization?	2 M	CO5	L1
(j)	Define vector field visualization.	2 M	CO5	L1
<b>All questions carry equal marks</b>				
Q.No		Marks	CO	BL
2(a)	Explain the importance of data visualization in analyzing large datasets.	5 M	CO1	L2
(b)	Discuss the historical development of data visualization and its milestones.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Discuss Gestalt principles and their relevance in visualization design.	5 M	CO1	L1
(b)	Analyze the relationship among data visualization, data mining and machine learning.	5 M	CO1	L3
<b>(OR)</b>				
4(a)	Illustrate how visual analytics and mapping together enhance the analytical process.	5M	CO2	L3
(b)	Explain different types of mappings that can be used for visual representation.	5M	CO2	L2
<b>(OR)</b>				
5(a)	Analyze the steps involved in designing an effective visual representation.	5M	CO2	L4
(b)	Evaluate the design principles in building interactive visualization applications.	5M	CO2	L4
<b>(OR)</b>				
6(a)	Explain the classification of visualization systems with suitable examples.	5 M	CO3	L2
(b)	Compare visualization of one, two, and multi-dimensional data.	5 M	CO3	L3
<b>(OR)</b>				
7(a)	Describe the process of visualizing text documents in a visualization environment.	5 M	CO3	L2
(b)	Describe a misleading visualization and explain why it leads to misinterpretation.	5 M	CO3	L2
<b>(OR)</b>				
8(a)	Describe the importance of graph visualization in social network analysis.	5M	CO4	L2
(b)	Compare visualization techniques for groups, trees, and networks.	5M	CO4	L2
<b>(OR)</b>				
9(a)	Discuss metaphorical visualization and provide suitable examples.	5M	CO4	L2
(b)	Describe how graphs help represent relationships among entities.	5M	CO4	L3
<b>(OR)</b>				
10(a)	How can vector field data be effectively visualized to represent direction and magnitude? Support your answer with an example.	5M	CO5	L3
(b)	Explain various methods used for volumetric data visualization.	5M	CO5	L2
<b>(OR)</b>				
11(a)	Analyze the role of data structures in optimizing storage, retrieval, and display operations in data visualization applications.	5M	CO5	L4
(b)	Describe how GIS technology improves the visualization of geographic data and assists in spatial pattern analysis.	5M	CO5	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23AE09-AIRCRAFT SYSTEMS AND INSTRUMENTS**  
(ASE)

*Passes*  
*25/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Explain the function of a yaw damper.	2M	CO1	L2
(b)	What are secondary flight control surfaces?	2M	CO1	L2
(c)	What are the different types of hydraulic fluids used in aircraft?	2M	CO2	L2
(d)	Differentiate between open loop and closed loop hydraulic systems.	2M	CO2	L2
(e)	Differentiate between a wet sump and a dry sump lubrication system.	2M	CO3	L2
(f)	What is the purpose of engine bleed air?	2M	CO3	L2
(g)	Define the term "cabin altitude" in pressurization systems.	2M	CO4	L2
(h)	Explain the concept of de-icing system.	2M	CO4	L2
(i)	List the errors in a Vertical Speed Indicator.	2M	CO5	L2
(j)	Identify the purpose of an altimeter.	2M	CO5	L2
Q.No	All questions carry equal marks	Marks	CO	BL
2.	Illustrate the working and advantages of the fly By wire control system.	10M	CO1	L2
	<b>(OR)</b>			
3.	Summarize in detail about auto pilot system with a block diagram.	10M	CO1	L2
4.	Draw a neat sketch of OLEO strut in main landing gear assembly and explain its operation.	10M	CO2	L2
	<b>(OR)</b>			
5.	Describe the operation of an aircraft pneumatic system and its applications.	10M	CO2	L2
6.	Outline with a neat sketch how fuel system function for a piston engine.	10M	CO3	L2
	<b>(OR)</b>			
7.	What are the basic components present in the aircraft fuel system? Explain briefly about gravity feed fuel system.	10M	CO3	L2
8.	Demonstrate the boot strap air cycle system with neat sketch.	10M	CO4	L2
	<b>(OR)</b>			
9.	With neat sketches, explain the evaporative vapour cycle and evaporative air cycle systems.	10M	CO4	L2
10.	Describe in detail about the purpose and importance of various types of temperature gauges used at different location of the aircraft.	10M	CO5	L2
	<b>(OR)</b>			
11.	Write short notes on (i) Turn and Bank indicator (ii) Tachometer.	10M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23CE10-GEOTECHNICAL ENGINEERING-I**

(CE)

Time : 3 hours

Max. Marks : 70

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25/11/25

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define specific gravity of soil solids.	2 M	CO1	L1
(b)	What is the activity of clay?	2 M	CO1	L1
(c)	Define total, neutral, and effective stress.	2 M	CO2	L1
(d)	What are the factors affecting permeability?	2 M	CO2	L1
(e)	What is quicksand condition?	2 M	CO3	L1
(f)	Define seepage force.	2 M	CO3	L1
(g)	Define relative compaction.	2 M	CO4	L1
(h)	What is over-consolidated soil?	2 M	CO4	L1
(i)	What is the significance of pore pressure in shear strength?	2 M	CO5	L1
(j)	Define effective stress parameters $c'$ and $\phi'$ .	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Explain various soil textures and their significance.	5 M	CO1	L2
(b)	Determine the dry density and void ratio for a soil with water content 15%, specific gravity 2.65, and bulk unit weight 18.5 kN/m <sup>3</sup> .	5 M	CO1	L3
<b>(OR)</b>				
3(a)	Explain BIS and Unified Soil Classification Systems.	5 M	CO1	L2
(b)	A soil has LL = 60% and PL = 30%. Calculate its liquidity and consistency indices when the natural moisture content is 45%.	5 M	CO1	L3
4.	Explain laboratory methods for determining permeability and discuss factors influencing it.	10 M	CO2	L3
<b>(OR)</b>				
5(a)	Discuss Darcy's law and its validity for different soils.	5M	CO2	L2
(b)	Compute equivalent horizontal and vertical permeability of a two-layer soil with thicknesses 2 m and 3 m, and permeability $1 \times 10^{-4}$ m/s and $2 \times 10^{-5}$ m/s.	5M	CO2	L3
6(a)	Discuss Laplace's equation and its use in seepage analysis.	5M	CO2	L2
(b)	Explain stepwise how flow nets are drawn and their uses in engineering practice.	5M	CO2	L2
<b>(OR)</b>				
7(a)	Compare Boussinesq's and Westergaard's theories.	5M	CO3	L2
(b)	Find the vertical stress at 5 m below the center of a uniformly loaded circular area (radius = 3 m, $q = 100$ kN/m <sup>2</sup> ).	5M	CO3	L3
8(a)	Describe laboratory compaction methods and equipment.	5M	CO4	L2
(b)	Find the percentage of air voids at OMC for a soil with dry density 1.85 g/cc, $G = 2.68$ , and $w = 12\%$ .	5M	CO4	L3
<b>(OR)</b>				
9(a)	Explain the difference between primary and secondary consolidation.	5M	CO4	L2
(b)	Discuss Terzaghi's theory of one-dimensional consolidation and derive the expression for time factor.	5M	CO4	L2
10(a)	Explain the stress-strain behavior of sand under drained and undrained conditions.	5M	CO5	L2
(b)	In a triaxial test, a sample of sand failed under a cell pressure of 100kN/m <sup>2</sup> and deviator stress 250 kN/m <sup>2</sup> . Find $c$ and $\phi$ .	5M	CO5	L3
<b>(OR)</b>				
11.	Describe the various shear strength tests with sketches and explain their advantages and limitations.	10M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23CS08-FORMAL LANGUAGES AND AUTOMATA THEORY**

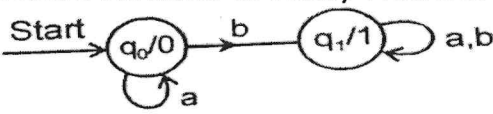
(CSE)

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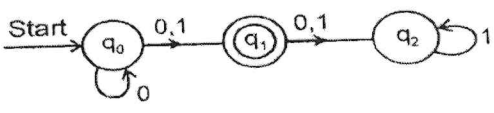
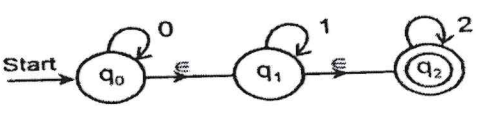
Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define a finite automaton with an example.	2 M	CO1	L2
(b)	Differentiate between DFA and NFA.	2 M	CO1	L2
(c)	What is a regular language?	2 M	CO2	L2
(d)	Define $\epsilon$ -closure of a state in NFA.	2 M	CO2	L2
(e)	Distinguish between left-linear and right-linear grammar.	2 M	CO3	L2
(f)	What is a parse tree? Why is it useful?	2 M	CO3	L2
(g)	Define pushdown automaton (PDA).	2 M	CO4	L2
(h)	List the main components of a PDA.	2 M	CO4	L2
(i)	What is the difference between deterministic and non-deterministic Turing Machines?	2 M	CO5	L2
(j)	Discuss about Universal Turing Machine	2 M	CO5	L2

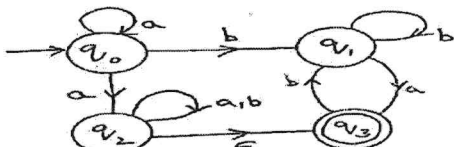
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Construct a DFA for the language of strings over $\{a, b\}$ that contain at least two consecutive b's.	5 M	CO1	L3
(b)	Convert the the following Moore Machine to Mealy Machine 	5 M	CO1	L3

(OR)

3(a)	Convert the following NFA to DFA 	5 M	CO1	L3
(b)	Convert the given NFA with $\epsilon$ (epsilon)- transitions then construct equivalent NFA without $\epsilon$ - transitions 	5 M	CO1	L3

4(a)	Write the regular expressions for each of the following: (i) Strings ending with 'ab' (ii) Strings with an even number of a's.	5 M	CO2	L3
(b)	Prove that the union and concatenation of regular languages are regular.	5 M	CO2	L3

(OR)

5(a)	Explain the pumping lemma for regular languages with an example.	5 M	CO2	L3
(b)	Convert given Finite Automata into regular expressions using Arden's theorem. 	5 M	CO2	L3

**23CS08-FORMAL LANGUAGES AND AUTOMATA THEORY**

6(a)	Construct a CFG for the language $L = \{a^n b^m \mid n, m \geq 1\}$ .	5 M	CO3	L3
(b)	Convert the following CFG into Chomsky Normal Form (CNF) $S \rightarrow ASA \mid aB$ $A \rightarrow B \mid S$ $B \rightarrow b$	5 M	CO3	L3
<b>(OR)</b>				
7(a)	What is ambiguous grammar? Show the below grammar $E \rightarrow E+E/E^*E/(E)/id$ is ambiguous	5 M	CO3	L3
(b)	Find a CFG, without $\epsilon$ productions, unit Productions and useless productions equivalent to the grammar defined by $S \rightarrow ABaC$ $A \rightarrow BC$ $B \rightarrow b/\epsilon$ $C \rightarrow D/\epsilon$ $D \rightarrow d$	5 M	CO3	L3
<b>(OR)</b>				
8(a)	Construct a PDA to accept the language $L = \{a^n b^n \mid n \geq 0\}$ . Show moves for string aabb.	5 M	CO4	L3
(b)	Illustrate the procedure to construct PDA from the Context Free Grammar. Construct PDA for the given productions $S \rightarrow aSb/aAB$ $S \rightarrow a/b/\epsilon$ $A \rightarrow c/d$ $B \rightarrow aA$	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Design a PDA to accept palindromes over the alphabet $\{a, b\}$ .	5 M	CO4	L3
(b)	Construct CFG for the given PDA $\delta(q_0, a, Z) = \{(q_0, XZ)\}$ $\delta(q_0, \epsilon, Z) = \{(q_1, X)\}$ $\delta(q_1, a, X) = \{(q_1, \epsilon)\}$ $\delta(q_1, b, X) = \{(q_1, XX)\}$ $\delta(q_1, a, Z) = \{(q_1, Z)\}$	5 M	CO4	L3
<b>(OR)</b>				
10(a)	Design a Turing Machine for the language $L = \{ww^R \mid w \in \{0,1\}^*\}$ .	5 M	CO5	L3
(b)	Discuss about Church-Turing Thesis.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Distinguish between recursive and recursively enumerable languages.	5 M	CO5	L2
(b)	Illustrate the relationship among <b>NP-Hard, and NP-Complete</b> problems using a neat diagram.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23CS06-OPERATING SYSTEMS**

(CSE(AI&amp;ML))

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the purpose of system programs?	2 M	CO1	L1
(b)	How does an operating system manage memory?	2 M	CO1	L2
(c)	What is a thread, and how does it differ from a process?	2 M	CO2	L2
(d)	Define CPU scheduling and state its objectives.	2 M	CO2	L1
(e)	What is the role of semaphores in solving synchronization problems?	2 M	CO3	L1
(f)	Describe the concept of a safe state in deadlock avoidance.	2 M	CO3	L2
(g)	Define paging in memory management.	2 M	CO4	L1
(h)	Describe a scenario where copy-on-write is beneficial.	2 M	CO4	L2
(i)	Define a file and its attributes in a file system.	2 M	CO5	L1
(j)	Define the principle of least privilege in protection mechanisms.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Describe the services provided by an operating system to users.	5 M	CO1	L2
(b)	Explain the purpose of system calls. Give examples of system calls.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe the user and operating system interface.	5 M	CO1	L2
(b)	Discuss the challenges of designing an operating system for a distributed environment.	5 M	CO1	L2
4(a)	Discuss the benefits and challenges of multiple processor scheduling.	5 M	CO2	L2
(b)	Compare and contrast FCFS and SJF scheduling algorithms with suitable examples.	5 M	CO2	L3
<b>(OR)</b>				
5(a)	Explain the different multithreading models and discuss their advantages and disadvantages.	5 M	CO2	L2
(b)	Discuss the benefits and drawbacks of Round Robin (RR) scheduling algorithm with an example.	5 M	CO2	L2
6(a)	Discuss the trade-offs between using semaphores and monitors for synchronization.	5 M	CO3	L2
(b)	A system has three processes and four resources. The processes have the following resource requests: P1: 2 resources, P2: 3 resources, P3: 2 resources The system has 7 resources available. Using the Banker's algorithm, determine if a safe state exists.	5 M	CO3	L3
<b>(OR)</b>				
7(a)	Compare and contrast Peterson's solution and mutex locks as synchronization techniques.	5 M	CO3	L2
(b)	A system has two processes, P1 and P2, that are deadlocked. The system has two resources, R1 and R2. P1 is holding R1 and waiting for R2, while P2 is holding R2 and waiting for R1. Explain how you would recover from this deadlock.	5 M	CO3	L3
8(a)	Describe the structure of a page table and its role in memory management.	5 M	CO4	L2
(b)	Consider a system with 4 frames and a reference string (1, 2, 3, 4, 5, 6, 7, 8, 9, 10). Calculate the number of page faults using LRU page replacement algorithm.	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Explain the concept of contiguous memory allocation and its advantages and disadvantages.	5 M	CO4	L2
(b)	Describe how paging improves memory utilization and system performance.	5 M	CO4	L2
10(a)	Discuss the importance of partitions and mounting in file system management.	5 M	CO5	L2
(b)	Explain how file sharing is implemented in file systems in detail.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Compare and contrast sequential and direct access methods in file systems.	5 M	CO5	L2
(b)	Explain the importance of free space management in file systems in detail.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23EC10-ANTENNAS AND WAVE PROPAGATION**

(ECE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Distinguish near field region and far field regions of Antennas.	2 M	CO1	L1
(b)	Define gain & directivity of an antenna.	2 M	CO1	L1
(c)	Write the directivity values of a half-wave dipole and a Hertzian dipole.	2 M	CO1	L1
(d)	Explain about Loop antennas and its applications.	2 M	CO2	L2
(e)	Compare broad side and end fire array Antennas.	2 M	CO3	L1
(f)	Explain about folded dipole antenna and its characteristics.	2 M	CO2	L2
(g)	Define spill over loss of a parabolic reflector.	2 M	CO2	L1
(h)	Mention applications of micro strip antenna.	2 M	CO2	L2
(i)	Define LOS and explain how it is related to Space Wave Propagation.	2 M	CO4	L2
(j)	Summarize various types of Wave Propagations.	2 M	CO4	L2
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	For a source, radiation intensity $U=6\cos\theta$ Calculate Directivity.	5 M	CO1	L3
(b)	Discuss the following antenna parameters (i) Radiation pattern (ii) Antenna efficiency (iii) Directive gain (iv) Beam Area.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Derive the relation between Directivity and maximum antenna aperture.	5 M	CO1	L3
(b)	Explain the Radiation mechanism from single wire Antenna.	5 M	CO2	L2
4.	Deduce that radiation resistance of half wave dipole antenna is $73\Omega$ .	10 M	CO1	L3
<b>(OR)</b>				
5(a)	Show that directivity of quarter wave monopole antenna is 3.28.	5 M	CO1	L3
(b)	Compare far fields of small loop antenna and short dipole antenna.	5 M	CO2	L2
6(a)	Explain about end fire array with increased directivity.	5M	CO3	L2
(b)	Show that impedance of two wire folded dipole antenna is $292\Omega$ .	5M	CO2	L3
<b>(OR)</b>				
7(a)	Discuss the working principle of Yagi Uda antenna.	5M	CO3	L2
(b)	A broad side array consists of 4 isotropic antenna separated by distance of $\lambda/4$ . Calculate the directivity, HPBW(Half power beam width) and BWFN(Beam width between first nulls ) for the given broad side array.	5M	CO3	L3
8(a)	Interpret Log periodic antenna regions based on lengths of dipoles with neat sketch.	5 M	CO2	L3
(b)	Analyze various feeding techniques of Parabolic Antenna.	5 M	CO2	L3
<b>(OR)</b>				
9(a)	Discuss the working principle of the Horn antenna and its types.	5 M	CO2	L2
(b)	Explain radiation mechanism of micro strip patch antennas.	5 M	CO2	L2
10(a)	Explain the gain measurement of an antenna by Direct comparison method.	5M	CO4	L2
(b)	Discuss briefly regarding (i) Skip Distance (ii) MUF.	5M	CO4	L2
<b>(OR)</b>				
11(a)	Calculate LOS if the height of the transmitting antenna is 3 Km and height of the receiving antenna is 5 Km by taking earth's effective radius into consideration.	5M	CO4	L3
(b)	Explain about the different types of layers in ionosphere with suitable Diagram.	5M	CO4	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23EE12-POWER SYSTEMS-II**

(EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is skin effect?	2M	CO1	L1
(b)	Define bundled conductors.	2M	CO1	L1
(c)	Define surge impedance loading.	2M	CO2	L1
(d)	Write the ABCD constants for a short transmission line.	2M	CO2	L2
(e)	What are the causes of surges in power systems?	2M	CO3	L2
(f)	Define travelling wave and surge impedance.	2M	CO3	L1
(g)	What are the effects of corona?	2M	CO4	L1
(h)	What is radio interference in transmission lines?	2M	CO4	L2
(i)	Name the different types of line insulators.	2M	CO5	L1
(j)	What are the causes of insulator failure?	2M	CO5	L2
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Derive the expression for the capacitance of a single-phase two-wire transmission line.	5M	CO1	L2
(b)	Explain the effect of skin and proximity effect on transmission line resistance.	5M	CO1	L2
<b>(OR)</b>				
3(a)	A three-phase line has conductors at the corners of an equilateral triangle of 4 m side. The conductor diameter is 1.2 cm. Determine the capacitance per phase per km.	5M	CO1	L3
(b)	Deduce an expression for line to neutral capacitance for a 3-phase overhead transmission line when the conductors are symmetrically placed.	5M	CO1	L2
<b>(OR)</b>				
4(a)	A 3-phase transmission line delivers 50 MW at 132 kV and 0.9 power factor lagging. The line has a resistance of 0.2 $\Omega$ /km and reactance of 0.4 $\Omega$ /km for 100 km. Calculate the voltage regulation and efficiency using nominal T method.	5M	CO2	L3
(b)	Calculate the voltage regulation of a short transmission line supplying 50 MW at 0.8 pf lagging over a line of 100 km with R = 0.2 $\Omega$ /km, X = 0.4 $\Omega$ /km.	5M	CO2	L3
<b>(OR)</b>				
5.	Derive the general transmission line equations in terms of ABCD constants and explain their significance.	10M	CO2	L2
<b>(OR)</b>				
6(a)	A surge of 100 kV travelling in a line of natural impedance 600 ohms arrives at a junction with two lines of impedances 800 ohms and 200 ohms respectively. Find the surge voltages and currents transmitted into each branch line.	5M	CO3	L3
(b)	A transmission line has a surge impedance of 250 ohms. Calculate the voltage and current waves when a surge of 100 kV travels along the line.	5M	CO3	L3
<b>(OR)</b>				
7.	Explain the behaviour of lightning and switching surges in a power system.	10M	CO3	L2
<b>(OR)</b>				
8(a)	Describe the following terms with reference to corona: (i) Critical disruptive voltage (ii) Visual critical voltage (iii) Power loss due to corona.	5M	CO4	L2
(b)	A 3-phase line with conductor radius 1.5 cm, spacing 3 m, operates at 132 kV, 50 Hz. Determine the critical disruptive voltage.	5M	CO4	L3
<b>(OR)</b>				
9(a)	Describe the various methods for reducing corona effect in an overhead transmission line.	5M	CO4	L2
(b)	Explain the methods of reducing corona losses and radio interference.	5M	CO4	L2
<b>(OR)</b>				
10(a)	Explain the different types of line insulators with neat sketches and their applications.	5M	CO5	L2
(b)	Discuss the factors affecting the selection of insulators for high-voltage lines.	5M	CO5	L2
<b>(OR)</b>				
11(a)	A line has a span of 200 m between level supports. The conductor weighs 0.9 kg/m and has a cross-sectional area of 200 mm <sup>2</sup> . Find the sag when the tension is 1600 kg. Take g = 9.81 m/s <sup>2</sup> .	5M	CO5	L3
(b)	A 3-phase line has span 250 m. Determine the sag and tension if conductor weight is 1.5 kg/m and horizontal tension is 3 kN.	5M	CO5	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram - 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23CS12-AUTOMATA THEORY & COMPILER DESIGN**

(IT)

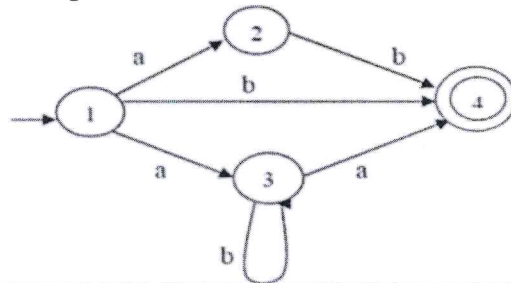
Time : 3 hours

Max. Marks : 70

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Q.No	Compulsory Question	Marks	CO	BL
1(a)	List the basic structural components of a finite automaton.	2 M	CO1	L1
(b)	What is the difference between a DFA and an NFA?	2 M	CO1	L2
(c)	Write any two applications of regular expressions.	2 M	CO2	L1
(d)	State the pumping lemma for regular languages.	2 M	CO2	L1
(e)	What is an instantaneous description of a Turing Machine?	2 M	CO3	L1
(f)	Define an undecidable problem. Give one example of such a problem.	2 M	CO3	L1
(g)	Define token, pattern, and lexeme with suitable examples.	2 M	CO4	L1
(h)	Differentiate between top-down parsing and bottom-up parsing.	2 M	CO4	L2
(i)	What is a Syntax-Directed Definition?	2 M	CO5	L1
(j)	What is the purpose of stack allocation in a run-time environment?	2 M	CO5	L2

Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Construct a DFA to accept all strings over {0,1} that end with '01'. Show the transition table and diagram.	5 M	CO1	L3
(b)	Convert the following NFA into DFA.	5 M	CO1	L3



(OR)

3(a)	Construct a DFA that accepts set of strings starts with 01 and ends with 01 over alphabet $\Sigma = \{0, 1\}$ .	5 M	CO1	L3
(b)	Write short notes on the closure properties of regular languages with respect to union and concatenation using automata concepts.	5 M	CO1	L2

4(a)	Prove that the set of regular languages is closed under union, concatenation, and Kleene star operations using algebraic properties.	5 M	CO2	L2
(b)	Show that $L = \{ a^p / p \text{ is a prime number} \}$ is not regular using pumping lemma.	5M	CO2	L3

(OR)

5(a)	Construct Leftmost Derivation, Rightmost Derivation, and Derivation Tree for the following grammar with respect to the string aabbabbba. $S \rightarrow Ab \mid bA$ $A \rightarrow aS \mid bAA \mid a$ $B \rightarrow bS \mid aBB \mid b$	5 M	CO2	L3
(b)	Define a context-free grammar (CFG) and construct a CFG for the language $L = \{ a^n b^n \mid n \geq 1 \}$ .	5 M	CO2	L3

**23CS12-AUTOMATA THEORY & COMPILER DESIGN**

6(a)	Define a Pushdown Automaton (PDA) and explain its formal components with a neat diagram.	5 M	CO3	L2
(b)	Classify the types of Turing machines.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Prove that the Halting Problem is undecidable.	5 M	CO3	L3
(b)	Show that for every Context-Free Grammar (CFG), there exists an equivalent PDA that accepts the same language.	5 M	CO3	L3
<b>(OR)</b>				
8(a)	Explain the structure of LEX program.	5 M	CO4	L2
(b)	Find the FIRST and FOLLOW for the non-terminals of the following grammar after eliminating the left recursion. $E \rightarrow E + T \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow (E) \mid id$	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Explain the input buffering technique with sentinels and without sentinels.	5 M	CO4	L3
(b)	Construct the LR(1) sets of items for the following grammar. $S' \rightarrow S$ $S \rightarrow C C C$ $C \rightarrow c C \mid d$	5 M	CO4	L3
<b>(OR)</b>				
10(a)	Draw the annotated parse tree for $3*5 + 4$ by considering only synthesized attributes.	5 M	CO5	L3
(b)	Construct triples and indirect triples for the assignment. $a = b * -c + b * -c$	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Explain about three address codes.	5 M	CO5	L2
(b)	Discuss how the runtime environment manages the execution context for a program, including memory management, function calls, and variable storage.	5 M	CO5	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B. Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23ME12-DESIGN OF MACHINE ELEMENTS**

(ME)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	State the maximum shear stress theory.	2 M	CO1	L1
(b)	What are the causes of stress concentration?	2 M	CO1	L2
(c)	What are the different types of bolts used in machine design?	2 M	CO2	L1
(d)	Differentiate between lap weld and butt weld.	2 M	CO2	L2
(e)	What are the common materials used for keys?	2 M	CO3	L1
(f)	Write the equation for torsional shear stress in a solid circular shaft.	2 M	CO3	L2
(g)	State the law of gearing.	2 M	CO4	L1
(h)	What are the stresses induced in a helical spring?	2 M	CO4	L1
(i)	Define bearing characteristic number.	2 M	CO5	L1
(j)	State the advantages of rolling contact bearings over sliding contact bearings.	2 M	CO5	L2
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Discuss various considerations to be taken while selecting materials for machine elements.	5 M	CO1	L2
(b)	A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to the maximum distortion strain energy theory of yielding.	5 M	CO1	L3
<b>(OR)</b>				
3(a)	Describe fatigue failure and explain the stages of fatigue fracture.	5 M	CO1	L2
(b)	A machine component is subjected to a flexural stress which fluctuates between + 300 MN/m <sup>2</sup> and - 150 MN/m <sup>2</sup> . Determine the value of minimum ultimate strength according to Soderberg relation. Take yield strength = 0.55 Ultimate strength; Endurance strength = 0.5 Ultimate strength; and factor of safety = 2.	5 M	CO1	L4
<b>(OR)</b>				
4(a)	Derive an expression for the torque required to tighten a bolt.	5 M	CO2	L3
(b)	The cylinder head of a steam engine is subjected to a pressure of 1N/mm <sup>2</sup> . It is held in position by means of 12 bolts. The effective diameter of the cylinder is 300 mm. A soft copper gasket is used to make the joint leak proof. Determine the size of the bolts so that the stress in the bolts does not exceed 100 MPa.	5 M	CO2	L3
<b>(OR)</b>				
5(a)	Explain the factors affecting the strength of welded joints.	5 M	CO2	L2
(b)	A circular steel bar 50 mm diameter and 200 mm long is welded perpendicularly to a steel plate to form a cantilever to be loaded with 5 kN at the free end. Determine the size of the weld, assuming the allowable stress in the weld as 100 MPa.	5 M	CO2	L3
<b>(OR)</b>				
6(a)	Compare solid and hollow shafts in terms of strength and weight.	5 M	CO3	L2

## 23ME12-DESIGN OF MACHINE ELEMENTS

(b)	A cast gear wheel is driven by a pinion and transmits 100 kW at 375 r.p.m. The gear has 200 machine cut teeth having 20° pressure angle and is mounted at the centre of a 0.4 m long shaft. The gear weighs 2000 N and its pitch circle diameter is 1.2 m. Design the gear shaft. Assume that the axes of the gear and pinion lie in the same horizontal plane.	5 M	CO3	L4
<b>(OR)</b>				
7(a)	Discuss the failures of keys under shear and compression.	5 M	CO3	L2
(b)	A 45 mm diameter shaft is made of steel with yield strength of 400MPa. A parallel key of size 14 mm wide and 9 mm thick made of steel with yield strength of 340 MPa is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of 2.	5 M	CO3	L3
<b>(OR)</b>				
8(a)	Explain the effect of module and pressure angle on gear strength.	5 M	CO4	L2
(b)	A 15 kW and 1200 r.p.m. motor drives a compressor at 300 r.p.m. through a pair of spur gears having 20° stub teeth. The centre to centre distance between the shafts is 400 mm. The motor pinion is made of forged steel having an allowable static stress as 210 MPa, while the gear is made of cast steel having allowable static stress as 140 MPa. Assuming that the drive operates 8 to 10 hours per day under light shock conditions, find from the standpoint of strength, (i) Module; (ii) Face width and (iii) Number of teeth and pitch circle diameter of each gear.	5 M	CO4	L4
<b>(OR)</b>				
9(a)	Compare open-coiled and close-coiled helical springs.	5 M	CO4	L2
(b)	A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350MPa and modulus of rigidity 84 kN/mm <sup>2</sup> , find the axial load which the spring can carry and the deflection per active turn.	5 M	CO4	L3
<b>(OR)</b>				
10(a)	Discuss the significance of bearing modulus and its use in design.	5 M	CO5	L2
(b)	The following data is given for a 360° hydrodynamic bearing: journal diameter = 100 mm, bearing length = 100 mm, radial load=50 kN, journal speed=1440rpm, radial clearance=0.12 mm, viscosity of lubricant = 16 cP Calculate: (i) minimum film thickness; (ii) coefficient of friction; and (iii) Power lost in friction.	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Describe the methods used to increase the life of rolling bearings.	5 M	CO5	L2
(b)	A ball bearing is subjected to a radial force of 2500 N and an axial force of 1000 N. The dynamic load carrying capacity of the bearing is 7350 N. The values of X and Y factors are 0.56 and 1.6 respectively. The shaft is rotating at 720 rpm. Calculate the life of the bearing.	5 M	CO5	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23ME81-SUSTAINABLE ENERGY TECHNOLOGIES**

(AI&amp;DS,CE,CSE and CSE(AI&amp;ML))

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define the solar constant and state its significance.	2 M	CO1	L1
(b)	What is the role of renewable energy in sustainable development?	2 M	CO1	L1
(c)	List the main components of a PV module circuit.	2 M	CO2	L1
(d)	Define PV module efficiency.	2 M	CO2	L1
(e)	List any two methods of solar energy storage.	2 M	CO3	L1
(f)	Explain latent heat storage.	2 M	CO3	L2
(g)	What are the main types of wind turbines?	2 M	CO4	L1
(h)	Discuss the factors affecting wind energy potential.	2 M	CO4	L1
(i)	Summarize two disadvantages of geothermal power generation.	2 M	CO5	L1
(j)	Classify the fuel cells.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2.	Explain the working of the instruments used for measuring solar radiation.	10 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe the working principle of sunshine recorders.	5 M	CO1	L2
(b)	Explain how tilt and orientation affect solar radiation on surfaces.	5 M	CO1	L2
4(a)	Describe the construction and working of a PV module with a neat diagram.	5 M	CO2	L2
(b)	Explain the effects of temperature and mismatch on PV performance.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Explain the various degradation mechanisms in PV modules.	5 M	CO2	L2
(b)	Describe the operation and selection of batteries for PV systems.	5 M	CO2	L2
6(a)	Explain the classification of concentrating collectors and explain any one of them.	5 M	CO3	L2
(b)	Describe the working of a solar pond with a neat sketch.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Explain the concept and working of a central receiver (power tower) system.	5 M	CO3	L2
(b)	Explain the working of a flat plate collector with neat diagram.	5 M	CO3	L2
8(a)	Derive the expression for Betz's limit for wind turbines.	5 M	CO4	L3
(b)	Explain the working of a fixed-dome biogas digester.	5 M	CO4	L2
<b>(OR)</b>				
9(a)	Describe the design parameters that influence wind turbine efficiency.	5 M	CO4	L2
(b)	Compare gasifiers and digesters in terms of conversion efficiency and fuel flexibility.	5 M	CO4	L2
10(a)	Discuss the limitations and challenges of geothermal energy utilization.	5 M	CO5	L2
(b)	Explain the working principle of a hydrogen fuel cell.	5 M	CO5	L2
<b>(OR)</b>				
11.	Differentiate between open-cycle and closed-cycle OTEC plants.	10 M	CO5	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23EC85-FUNDAMENTALS OF SATELLITE COMMUNICATIONS**  
(ASE & IT)

*Answered  
27/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the necessity of spin stabilization in satellite communications?	2 M	CO1	L1
(b)	What are the requirements for orbit determination?	2 M	CO4	L1
(c)	State Kepler's third law of planetary motion and its application to satellite orbits.	2 M	CO4	L3
(d)	Define station keeping and list the various methods of station keeping.	2 M	CO4	L2
(e)	Write the Friis Transmission equation for the power received earth station.	2 M	CO3	L2
(f)	What is tracking? How is it implemented in satellites?	2 M	CO3	L1
(g)	What is gravity gradient stabilization? Mention its advantages.	2 M	CO1	L1
(h)	What is the role of sensors in spacecraft control? Mention any two sensors.	2 M	CO1	L1
(i)	What are the different codes used in GPS?	2 M	CO1	L2
(j)	What is the role of a home receiver in DTH systems?	2 M	CO1	L1
<b>All questions carry equal marks</b>				
2(a)	Describe the communication subsystem of a satellite with a neat block diagram.	5 M	CO1	L2
(b)	Explain the characteristics and applications of various communication frequency bands used in satellite communication.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe the roles of guidance and control subsystems along with bus electronics.	5 M	CO1	L3
(b)	Discuss the need for space communication in the context of global connectivity, broadcasting, and remote sensing applications.	5 M	CO2	L2
4.	What are the six classical orbital elements used to define a satellite's orbit? Explain the concept of orbital perturbations, and describe the primary sources of these perturbations for a satellite in Earth orbit.	10 M	CO4	L3
<b>(OR)</b>				
5(a)	State and Explain Kepler's three laws of planetary motion in detail. How do they apply to artificial satellites orbiting the Earth?	5M	CO4	L3
(b)	Differentiate between Expendable Launch Vehicles and Reusable Launch Vehicles with suitable examples.	5M	CO4	L2
6(a)	Explain the Telemetry, Tracking, Command, and monitoring system with a neat sketch.	5M	CO3	L2
(b)	Discuss the design considerations for ensuring reliability, redundancy, and fault tolerance in solar arrays and batteries.	5M	CO3	L3
<b>(OR)</b>				
7(a)	Discuss the challenges in using Silicon and GaAs solar cells in space.	5M	CO3	L3
(b)	Explain the factors influencing the selection of a specific battery type for a given mission profile.	5M	CO3	L2
8(a)	Illustrate in detail about attitude and orbit control systems.	5M	CO1	L2
(b)	Discuss in detail the three-axis stabilization system.	5M	CO1	L2
<b>(OR)</b>				
9.	Discuss the working principle, advantages, and limitations of the following attitude sensors: Star/Sun Sensors and Earth Sensors.	10M	CO1	L3
10(a)	Interpret the principles that are used to locate the position in the GPS.	5M	CO1	L2
(b)	Describe the components of a Direct-to-Home (DTH) system and the functioning of a Home Receiver system in DTH broadcasting.	5M	CO1	L2
<b>(OR)</b>				
11(a)	Explain GPS receiver operation in detail.	5M	CO2	L2
(b)	Discuss the objectives and applications of RADARSAT.	5M	CO2	L3

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23AM81-PYTHON PROGRAMMING FOR AI&ML**  
(ECE)

Time : 3 hours

Max. Marks : 70

*Answered*  
*27/11/25*

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define a list in Python with syntax.	2 M	CO1	L1
(b)	What is the difference between list and tuple?	2 M	CO1	L1
(c)	Define an AI agent.	2 M	CO2	L1
(d)	Mention any two types of search algorithms.	2 M	CO2	L1
(e)	Define an array in NumPy.	2 M	CO3	L1
(f)	Define One-Hot Encoding.	2 M	CO3	L1
(g)	Define data visualization.	2 M	CO4	L1
(h)	Mention two libraries used for data visualization.	2 M	CO4	L1
(i)	Define Machine Learning.	2 M	CO5	L1
(j)	Define K-Nearest Neighbour algorithm.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Explain different operations on lists with examples.	5 M	CO1	L2
(b)	Compare and contrast mutable and immutable objects in Python.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Discuss real-world applications of Python data structures.	5 M	CO1	L2
(b)	Write a Python program to count elements using lists and dictionaries.	5 M	CO1	L3
4(a)	Explain the concept of AI agents and their types.	5 M	CO2	L2
(b)	Compare uninformed and informed search strategies.	5M	CO2	L3
<b>(OR)</b>				
5(a)	Explain Breadth-First Search with an example.	5M	CO2	L3
(b)	Explain Depth-First Search with an example.	5M	CO2	L3
6(a)	Explain the features and advantages of NumPy arrays.	5M	CO3	L2
(b)	Explain creation and indexing operations in Pandas DataFrames.	5M	CO3	L3
<b>(OR)</b>				
7(a)	Discuss methods to handle missing and outlier values in datasets.	5M	CO3	L2
(b)	Discuss the role of NumPy and Pandas in data manipulation.	5M	CO3	L2
8(a)	Explain the importance of data visualization in analysis.	5M	CO4	L2
(b)	Discuss different types of plots used in Matplotlib and Seaborn.	5M	CO4	L3
<b>(OR)</b>				
9(a)	Explain how to identify patterns using data visualization.	5M	CO4	L2
(b)	Explain how EDA helps in understanding data distributions.	5M	CO4	L2
10.	Explain different types of Machine Learning with examples.	10M	CO5	L2
<b>(OR)</b>				
11(a)	Discuss Support Vector Machine algorithm with example.	5M	CO5	L2
(b)	Discuss applications of Machine Learning in real-world scenarios.	5M	CO5	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23AD82-FUNDAMENTALS OF DATA SCIENCE**

(EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List any two applications of Python.	2M	CO1	L1
(b)	Define tuple in python.	2M	CO1	L1
(c)	What is datafication?	2M	CO2	L1
(d)	Describe the importance of Exploratory data analysis.	2M	CO2	L1
(e)	Write the syntax to create a list using numpy.	2M	CO3	L1
(f)	What are the key benefits of Boolean indexing?	2M	CO3	L1
(g)	Write any two applications of python pandas.	2M	CO4	L1
(h)	Write syntax to create a data frame using python Pandas library.	2M	CO4	L1
(i)	Define the key steps involved in data preprocessing technique.	2M	CO5	L1
(j)	What is data aggregation?	2M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Describe any five key features of Python programming language.	5M	CO1	L2
(b)	Explain how indexing and slicing work in Python strings with suitable examples.	5M	CO1	L2
<b>(OR)</b>				
3(a)	Develop a Python program to input 5 numbers into a list and display their sum, average, and maximum value.	5M	CO1	L3
(b)	Explain how keys and values are stored in a Python dictionary with an example.	5M	CO1	L2
4.	Describe data science life cycle with neat diagram.	10M	CO2	L2
<b>(OR)</b>				
5(a)	Analyze the importance of exploratory data analysis (EDA) in Python and describe which libraries are commonly used for it.	5M	CO2	L4
(b)	Explain how a Data Scientist uses Python for data cleaning and transformation.	5M	CO2	L2
6(a)	Explain the difference between Python lists and NumPy ndarrays with suitable examples.	5M	CO3	L2
(b)	Explain how multidimensional arrays differ from one-dimensional arrays in structure and storage.	5M	CO3	L2
<b>(OR)</b>				
7(a)	Explain how the np.where() function is used to implement conditional logic in arrays with a suitable example.	5M	CO3	L2
(b)	Develop a Python program using NumPy to create a Boolean array that identifies all elements greater than a given threshold in a numeric array.	5M	CO3	L3
8.	Develop a Python program using Pandas to create a DataFrame from a dictionary and display its basic information using functions like head(), info(), and describe().	10M	CO4	L3
<b>(OR)</b>				
9(a)	Explain the difference between loc[] and iloc[] methods in Pandas with suitable examples.	5M	CO4	L2
(b)	Explain how Boolean indexing is used for filtering data in a Pandas DataFrame with an example.	5M	CO4	L2
10(a)	Explain the difference between read_csv() and read_table() functions in Pandas with suitable examples.	5M	CO5	L2
(b)	Explain how a connection between Python and a database is established using the sqlite3 module.	5M	CO5	L2
<b>(OR)</b>				
11.	Explain the difference between pivot() and melt() functions in Pandas with suitable examples.	10M	CO5	L2

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

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B.Tech. (V Semester) Regular Examinations

**23ME82-INTRODUCTION TO INDUSTRIAL ROBOTICS**

(IT)

*Handwritten signature and date: 27/11/24*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define workspace of a robot.	2 M	CO1	L1
(b)	What are end-effectors? Give one example.	2 M	CO1	L1
(c)	List any two advantages of pneumatic actuators.	2 M	CO2	L1
(d)	What is the function of a servo motor in robotics?	2 M	CO2	L1
(e)	Define Denavit-Hartenberg (D-H) parameters.	2 M	CO3	L1
(f)	What is forward kinematics?	2 M	CO3	L1
(g)	Mention any two simulation tools used in robotics.	2 M	CO4	L1
(h)	Define skew motion.	2 M	CO4	L1
(i)	Define supervised learning.	2 M	CO5	L1
(j)	Mention any two OpenCV functions used in vision systems.	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2.	With neat diagrams, explain robot anatomy including joints, links, DoF, and kinematic chain.	10 M	CO1	L3
<b>(OR)</b>				
3(a)	Discuss the classification of robots based on control systems.	5 M	CO1	L2
(b)	Explain the evolution of robotics from early automation to Industry 4.0.	5 M	CO1	L3
4.	Compare and evaluate pneumatic, hydraulic, and electrical actuators with respect to cost, performance, environmental impact, and integration challenges in robotics.	10 M	CO2	L3
<b>(OR)</b>				
5(a)	Describe the working of a stepper motor and its application in robotics.	5 M	CO2	L3
(b)	Write a short note on feedback mechanisms in robotic systems.	5 M	CO2	L2
6.	Write a Python/Matlab procedure to compute forward kinematics.	10 M	CO3	L3
<b>(OR)</b>				
7(a)	Solve a simple 2-link planar manipulator forward kinematics problem.	5 M	CO3	L3
(b)	Discuss challenges in solving inverse kinematics.	5 M	CO3	L3
8(a)	Explain the working principle of Robo DK simulation software.	5 M	CO4	L3
(b)	Explain trajectory planning for a robot arm using Python.	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Compare online and offline robot programming methods.	5 M	CO4	L2
(b)	Explain the process of trajectory generation.	5 M	CO4	L3
10(a)	Describe steps in image preprocessing for robotics.	5 M	CO5	L2
(b)	Describe applications of vision in pick-and-place robots.	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Explain how Open CV is used in object detection.	5 M	CO5	L3
(b)	Discuss the role of AI models in robotic vision.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23EE84-ELECTRIC VEHICLES**  
(ME)

*Answered*  
*27/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are factors affecting vehicle dynamics?	2 M	CO1	L1
(b)	If a 1000 kg vehicle accelerates from 0 to 20 m/s in 10 s, what is the average acceleration?	2 M	CO1	L3
(c)	What regulation relates to battery transport safety?	2 M	CO2	L2
(d)	Mention a parameter affecting battery life.	2 M	CO2	L2
(e)	How does gear ratio affect output torque?	2 M	CO3	L1
(f)	Estimate output power for 60 Nm torque at 3500 rpm.	2 M	CO3	L3
(g)	Compare braking energy recovery for EV and conventional car.	2 M	CO4	L2
(h)	What is function of a clutch in EVs?	2 M	CO4	L1
(i)	State challenges in hybrid system integration.	2 M	CO5	L2
(j)	Estimate fuel savings if electric drive covers 70% of 50 km trip.	2 M	CO5	L3
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Compare EV propulsion systems with internal combustion vehicle systems.	5 M	CO1	L2
(b)	Given a vehicle mass of 1200 kg, calculate the energy required to accelerate from 0 to 60 km/h in 8 seconds.	5 M	CO1	L3
<b>(OR)</b>				
3(a)	Discuss the efficiency gains possible by integrating regenerative braking.	5 M	CO1	L2
(b)	Calculate the total energy usage for a 30 km city trip considering typical energy losses.	5 M	CO1	L3
<b>(OR)</b>				
4(a)	Discuss standards and regulations relevant for EV batteries.	5 M	CO2	L2
(b)	For a vehicle with pack capacity of 50 kWh and average consumption 0.18 kWh/km, estimate range.	5 M	CO2	L3
<b>(OR)</b>				
5(a)	Given maximum current and voltage, compute peak power output for a battery.	5 M	CO2	L3
(b)	Design a battery pack for an EV needing 400 V and 60 kWh using 3.7 V, 5 Ah cells.	5 M	CO2	L3
<b>(OR)</b>				
6(a)	Explain construction and operation of DC motors used in EVs.	5 M	CO3	L3
(b)	For a motor producing 110 Nm at 3500 rpm, calculate output power.	5 M	CO3	L3
<b>(OR)</b>				
7(a)	Compare efficiency and cost of induction versus permanent magnet motors for EVs.	5 M	CO3	L3
(b)	Estimate current drawn by a 45 kW, 350 V AC motor at full load.	5 M	CO3	L3
<b>(OR)</b>				
8(a)	Analyze reliability of drive train alternatives of components under high torque with motor.	5 M	CO4	L3
(b)	Calculate tractive effort at the wheel if wheel radius is 0.35 m and applied torque is 140 Nm.	5 M	CO4	L3
<b>(OR)</b>				
9(a)	Compare single and multi-speed transmission effectiveness for EVs.	5 M	CO4	L3
(b)	Estimate energy recovered during regenerative braking for an EV of 950 kg from 55 km/h to stop.	5 M	CO4	L3
<b>(OR)</b>				
10(a)	Describe battery pack design management strategies in hybrid electric vehicles.	5 M	CO5	L2
(b)	Analyze the development process of electric and ICE powertrains.	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Analyze cost-benefit tradeoffs in hybrid vehicle development.	5 M	CO5	L3
(b)	Explain the role of regenerative braking in hybrid vehicles.	5 M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

**23AD07-EXPLORATORY DATA ANALYSIS WITH PYTHON**  
(AI&DS)

Time : 3 hours

Max. Marks: 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are the core objectives and goals of Exploratory Data Analysis (EDA)?	2M	CO1	L1
(b)	Distinguish between nominal data and ordinal data. Give an example of each.	2M	CO1	L2
(c)	Assume that you have a dataset showing performance of the students in semester examination. Which chart would best visualize this data and why?	2M	CO2	L3
(d)	What is the use of a line chart and give an example situation where a line chart would be more appropriate than a bar chart?	2M	CO2	L1
(e)	What is the core principle of Random Sampling and how it is useful in data analysis?	2M	CO3	L1
(f)	What is the difference between 'merging data frames using database-style joins' and 'concatenation along an axis' in pandas?	2M	CO3	L1
(g)	What fundamental insights do the variance and standard deviation tell about a dataset?	2M	CO4	L1
(h)	Write any two differences between univariate analysis and bivariate analysis.	2M	CO4	L2
(i)	List the key stages of a unified machine learning workflow along with the objective of each stage.	2M	CO5	L1
(j)	What is Data Cleaning? Suggest any two possible methods for Data Cleaning?	2M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Assume that you are provided with criminal dataset. Describe the first five investigative questions you would ask as part of your initial EDA with an aim to understand the basic structure and content quality of data set.	5M	CO1	L3
(b)	Justify the following statement with suitable justification: "Exploratory Data Analysis (EDA) is considered a key initial step in data science."	5M	CO1	L4
<b>(OR)</b>				
3(a)	Outline the key stages of a standard Exploratory Data Analysis (EDA) process along with the objective and key activities of each stage.	5M	CO1	L2
(b)	Compare and contrast EDA with classical statistical analysis.	5M	CO1	L3
4(a)	What is the primary purpose of a histogram in Exploratory Data Analysis? Explain with an example.	5M	CO2	L2
(b)	Define data transformation in the context of EDA. And, write brief about the importance of data transformation before visualization and modelling.	5M	CO2	L1
<b>(OR)</b>				
5(a)	What is data cleansing? Describe the common data issues found in email datasets that require cleansing.	5M	CO2	L2

## 23AD07-EXPLORATORY DATA ANALYSIS WITH PYTHON

(b)	Illustrate the process of applying different visualization techniques using sample dataset by drawing Line Chart, Bar Chart, Scatter Plots and Bubble Plot.	5M	CO2	L3
6(a)	Discuss the advantages and challenges of performing data transformation on large-scale datasets.	5M	CO3	L4
(b)	Explain how data can be reshaped and pivoted using pandas with the help of an example scenario where reshaping or pivoting is useful.	5M	CO3	L2
<b>(OR)</b>				
7(a)	Describe any one of the methods used to handle outlier problem and analyze the influence of outliers on model performance and statistical summaries.	5M	CO3	L4
(b)	What is the impact of missing data on analysis outcome? Illustrate the following techniques using python code to handle missing data (i) NaN values in mathematical Operations (ii) Forward and Backward filling of missing values	5M	CO3	L3
8(a)	What are the main components of time series analysis? Analyze how time series analysis support decision-making in sales forecasting?	5M	CO4	L4
(b)	A real estate marketing analyst collects the following quarterly sales data of houses(Total turnover in Lakhs) from five areas: 320, 150, 275, 460, 550. (i) Calculate the mean, median, and mode. (ii) Which measure best represents the central tendency of this data, and why?	5M	CO4	L3
<b>(OR)</b>				
9(a)	What is the purpose of univariate, bivariate, and multivariate analysis. Illustrate your explanation with one appropriate statistical measure commonly used for each.	5M	CO4	L1
(b)	In an application of analyzing the delivery times (in minutes) of an online food deliver service: i) Calculate Quartile1(Q1), Q2, and Q3 for the following dataset: [10, 12, 20, 24, 28, 32, 37, 38, 41]. What Quartile tells us about in this example case?	5M	CO4	L3
10(a)	What are the best practices for dividing a dataset into training, validation, and test sets. Give your justification to claim that this process is essential for ensuring model generalization and preventing overfitting?	5M	CO5	L2
(b)	What are the key considerations in deploying a machine learning model into production while keeping the model remains effective and reliable over time?	5M	CO5	L2
<b>(OR)</b>				
11(a)	Explain the importance of data pre-processing and preparation in machine learning. And how do these steps influence the model performance.	5M	CO5	L2
(b)	Compare the following model evaluation metrics: accuracy, precision, recall, F1-score, and ROC. And in what situations might one evaluation metric be more appropriate than another?	5M	CO5	L2

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B.Tech. (V Semester) Regular Examinations

23AE11-FINITE ELEMENT ANALYSIS

(ASE)

*Answered*  
29/11/2025

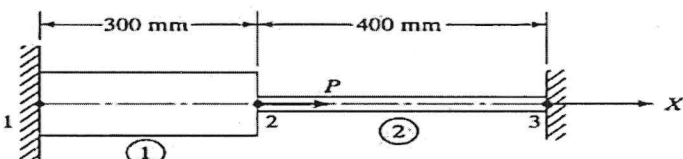
Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is meant by discretization in FEM?	2 M	CO1	L1
(b)	Write the shape functions for a linear 1D bar element.	2 M	CO1	L1
(c)	Give examples of 2D elements used in FEM.	2 M	CO2	L1
(d)	How many nodes and degrees of freedom does a CST element have?	2 M	CO2	L1
(e)	Why is the strain constant in an axisymmetric triangular element?	2 M	CO3	L1
(f)	Write the 1-point Gauss quadrature formula.	2 M	CO3	L1
(g)	What is meant by a plane truss?	2 M	CO4	L1
(h)	List out the advantage of using Hermite shape functions in bending problems.	2 M	CO4	L1
(i)	How does dynamic analysis differ from static analysis?	2 M	CO5	L2
(j)	In which cases is a lumped mass matrix preferred?	2 M	CO5	L1

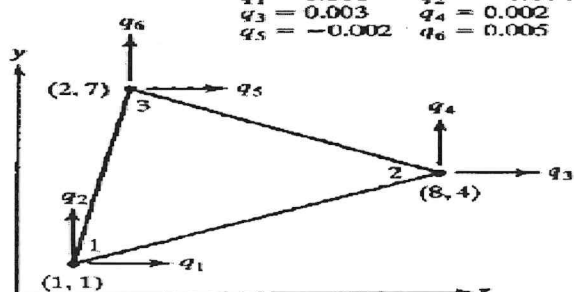
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Write the advantages and applications of finite element method.	5 M	CO1	L1
(b)	If a displacement field is described by $u = (-x^2 + 2y^2 + 6xy)10^{-4}$ ; $v = (3x + 6y - y^2) 10^{-4}$ Determine $\epsilon_x$ , $\epsilon_y$ and $\gamma_{xy}$ at the point $x=1, y=0$	5 M	CO1	L3

(OR)

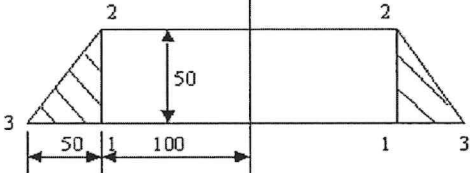
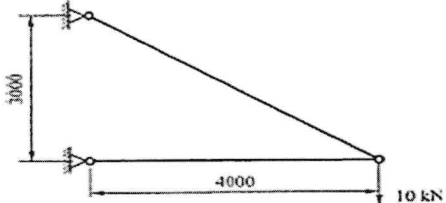
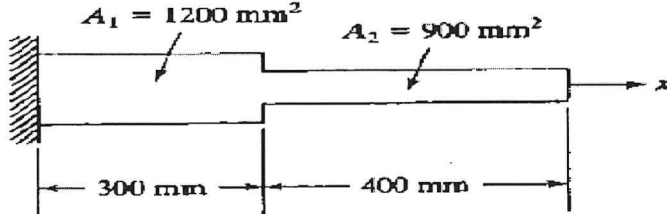
3.	<p>Consider the bar shown in Fig. An axial load <math>P = 200 \times 10^3</math> N is applied as shown. Using the penalty approach for handling boundary conditions, do the following: (i) Determine the nodal displacements (ii) Determine the stress in each material. (iii) Determine the reaction forces.</p>  <p>Aluminum: <math>A_1 = 2400 \text{ mm}^2</math>, <math>E_1 = 70 \times 10^9 \text{ N/m}^2</math> Steel: <math>A_2 = 600 \text{ mm}^2</math>, <math>E_2 = 200 \times 10^9 \text{ N/m}^2</math></p>	10 M	CO1	L3
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4(a)	Derive the Element stiffness matrix for a CST element.	5 M	CO2	L3
(b)	Find the Jacobian matrix (J) of Triangular element with coordinates (1.5,2), (7,3.5) and (4,7)	5 M	CO2	L3

(OR)

5.	<p>For The Triangular Element Shown in Fig. Obtain the Strain displacement matrix [B] and Strains <math>\epsilon_x</math>, <math>\epsilon_y</math> and <math>\gamma_{xy}</math>.</p>  <p><math>q_1 = 0.001</math>, <math>q_2 = -0.004</math> <math>q_3 = 0.003</math>, <math>q_4 = 0.002</math> <math>q_5 = -0.002</math>, <math>q_6 = 0.005</math></p>	10 M	CO2	L3
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**23AE11-FINITE ELEMENT ANALYSIS**

6(a)	The nodal coordinates for an axi-symmetric element are (1,3), (6,8) and (4,6). Find the strain-displacement matrix for the element at centroid.	5 M	CO3	L3
(b)	Express the shape function for 4 noded isoparametric quadrilateral element.	5 M	CO3	L3
(OR)				
7.	An axi-symmetric ring element is shown in fig. Compute the Jacobian matrix [J], Strain displacement matrix [B]. 	10 M	CO3	L3
8.	A two-member truss is as shown in Fig. The cross-sectional area of each member is 200 mm <sup>2</sup> and the modulus of elasticity is 200GPa. Determine the deflections, stresses in each of the members. 	10 M	CO4	L3
(OR)				
9(a)	Explain the Structural Analysis of beam element subjected to static loading with example.	5 M	CO4	L2
(b)	A Cantilever beam of 4 m length is subjected to point loads at the distances of 2m and 4m from the fixed end of 10 KN and 20 KN respectively. Determine the global stiffness matrix. Take E=2 x 10 <sup>5</sup> MPa and A= 400 mm <sup>2</sup> .	5 M	CO4	L3
10(a)	Explain the following with examples: (i) Lumped mass matrix (ii) Types of vibrations.	5 M	CO5	L2
(b)	What is the importance of comparing analytical and FEM results for a stepped bar?	5 M	CO5	L2
(OR)				
11.	Estimate the eigenvalues and eigenvectors for the stepped bar shown in Fig. Take E= 200Gpa and p= 7850 kg/m <sup>3</sup> . 	10 M	CO5	L3

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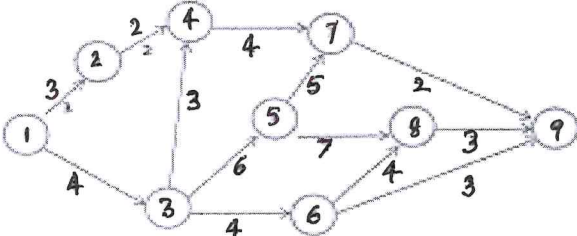
**23CE13-CONSTRUCTION TECHNOLOGY AND MANAGEMENT**

(CE)

*Boooy*  
*29/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Write any two advantages and disadvantages of planning.	2 M	CO1	L1
(b)	Draw the network for the activities given. Activity   1-2   1-3   2-3   2-4   3-4	2 M	CO4	L2
(c)	Define 'crashing' in the context of project scheduling.	2 M	CO4	L1
(d)	How can schedule delays be detected and managed?	2 M	CO4	L1
(e)	Differentiate handling and hoisting equipment	2 M	CO2	L1
(f)	What is meant by capacities of trucks?	2 M	CO2	L1
(g)	Enumerate the types of crushers.	2 M	CO2	L1
(h)	Why is it important to avoid free-fall when placing concrete?	2 M	CO3	L1
(i)	Classify piles.	2 M	CO2	L1
(j)	What is the importance of quality control in construction?	2 M	CO3	L1
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Write the objectives, concept and importance of construction management.	5 M	CO1	L2
(b)	Discuss the roles of Project Manager in detail. Mention four key qualities or skills a construction project manager should possess.	5 M	CO1	L2
<b>(OR)</b>				
3.	Determine the critical path, EST, EFT, LST, LFT, total and free floats for the network for the project shown in Figure. 	10 M	CO4	L3
4(a)	Explain about Project evaluation and review technique with one example. Draw the 'bell curve' (Beta distribution curve) showing optimistic time, pessimistic time and most likely time estimates.	5 M	CO4	L2
(b)	With the aid of flowchart, explain "project Updating". Write short notes on updating and its necessity.	5 M	CO4	L2
<b>(OR)</b>				
5(a)	Explain about Resource Analysis and Resource Allocation.	5 M	CO4	L2
(b)	Enumerate the construction software used in the construction field and its application.	5 M	CO4	L3
6(a)	Explain the important economical consideration required for construction equipment.	5 M	CO2	L2
(b)	Discuss about the rear dump truck and its significance.	5 M	CO2	L2
<b>(OR)</b>				
7(a)	Write about compaction equipment and various types of rollers with relevant sketches.	5 M	CO2	L2
(b)	On what basis, cranes are classified. Explain and discuss their applications.	5 M	CO2	L2
8(a)	Discuss briefly the types of crushers and its application.	5 M	CO3	L2
(b)	What do you understand by screening of aggregate? Explain the purpose, and its necessity in construction industry.	5 M	CO3	L2
<b>(OR)</b>				
9(a)	Explain the types and uses of concrete mixers.	5 M	CO3	L2
(b)	Explain finishing process of concrete and the steps involved in it.	5 M	CO3	L2
10(a)	Differentiate cast-in-situ method and precast method of piling.	5 M	CO3	L2
(b)	Explain the installation of piles in detail.	5 M	CO3	L2
<b>(OR)</b>				
11(a)	What is fabrication? Explain about welding and bolting.	5 M	CO3	L2
(b)	Why safety is important on construction project site? Write the safety measures to be adopted in construction site.	5 M	CO3	L2

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B.Tech. (V Semester) Regular Examinations

**23AD02-ARTIFICIAL INTELLIGENCE**

(CSE & IT)

*28/11/25*  
*29/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define Rationality.	2 M	CO1	L1
(b)	What is an Agent?	2 M	CO1	L1
(c)	Define heuristic function.	2 M	CO2	L1
(d)	What is hill climbing?	2 M	CO2	L1
(e)	What is uncertainty in AI?	2 M	CO3	L1
(f)	Define semantic network.	2 M	CO3	L1
(g)	What is unification?	2 M	CO4	L1
(h)	What is inference in first-order logic?	2 M	CO4	L1
(i)	What is DART?	2 M	CO5	L1
(j)	Discuss about an expert system.	2 M	CO5	L1
<b>(OR)</b>				
Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Explain the PEAS (Performance, Environment, Actuators, Sensors) representation in detail with an example.	5 M	CO1	L2
(b)	Describe the structure of an intelligent agent with a neat diagram.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Discuss about the Foundations of AI.	5 M	CO1	L2
(b)	What is AI? Explain any four approaches to AI.	5 M	CO1	L2
<b>(OR)</b>				
4.	Describe the A* algorithm and explain how it finds an optimal solution with an example in detail.	10 M	CO2	L2
<b>(OR)</b>				
5(a)	Describe the working of Breadth-First Search (BFS) with an example.	5 M	CO2	L2
(b)	Explain Alpha-Beta pruning with an example.	5 M	CO2	L2
<b>(OR)</b>				
6(a)	Explain different knowledge representation techniques.	5 M	CO3	L2
(b)	Discuss propositional logic with suitable examples.	5 M	CO3	L2
<b>(OR)</b>				
7(a)	Illustrate about Dempster-Shafer theory.	5 M	CO3	L3
(b)	Explain Bayes' probabilistic inference with an example.	5 M	CO3	L2
<b>(OR)</b>				
8(a)	Outline about statistical learning.	5 M	CO4	L3
(b)	Discuss explanation-based learning with an example.	5 M	CO4	L2
<b>(OR)</b>				
9.	Illustrate forward chaining and backward chaining with examples.	10 M	CO4	L3
<b>(OR)</b>				
10(a)	Explain the components and architecture of an expert system.	5 M	CO5	L2
(b)	Demonstrate the applications of expert systems in real-world domains.	5 M	CO5	L3
<b>(OR)</b>				
11(a)	Discuss the role of knowledge engineers in expert systems.	5 M	CO5	L2
(b)	Explain the advantages and limitations of expert systems.	5 M	CO5	L2

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23CS11-CLOUD COMPUTING**

(CSE(AI&ML))

*180309*  
*21/11/25*

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define Utility Computing.	2 M	CO1	L1
(b)	List two characteristics of Cloud Computing.	2 M	CO1	L1
(c)	Differentiate between Remote Procedure Call (RPC) and Service-Oriented Architecture (SOA).	2 M	CO2	L2
(d)	Explain the concept of Distributed Computing.	2 M	CO2	L2
(e)	Name two popular container orchestration tools.	2 M	CO3	L1
(f)	Define Hypervisor.	2 M	CO3	L1
(g)	List the categories of cloud interoperability.	2 M	CO4	L1
(h)	Define Fault Tolerance in the context of cloud.	2 M	CO4	L1
(i)	List the services offered under Server less computing.	2 M	CO5	L1
(j)	What is Quantum Cloud Computing?	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Classify and describe the different types of cloud deployment models.	5 M	CO1	L2
(b)	Explain the advantages and benefits of Cloud Computing.	5 M	CO1	L2
<b>(OR)</b>				
3(a)	Describe the history and evolution of Cloud Computing.	5 M	CO1	L2
(b)	Describe the importance of the five major actors in the Cloud Computing reference model.	5 M	CO1	L2
4.	Break down the concept of Inter-process communication and discuss its importance for distributed computing.	10 M	CO2	L2
<b>(OR)</b>				
5(a)	Illustrate the architecture of a SIMD hardware computing system.	5 M	CO2	L2
(b)	Compare and contrast Service-Oriented Architecture (SOA) and Web Services.	5 M	CO2	L2
6(a)	Outline the pros and cons of virtualization technology.	5 M	CO3	L2
(b)	Use the appropriate technology (e.g., Docker or Kubernetes) to illustrate how a cloud application is deployed using container orchestration.	5 M	CO3	L3
<b>(OR)</b>				
7(a)	Discuss the different taxonomy of virtualization techniques (e.g., hardware, OS, application).	5 M	CO3	L2
(b)	Apply VMware or Xen concepts to explain how hardware virtualization is achieved.	5 M	CO3	L3
8(a)	Analyze the security challenges associated with the cloud deployment models.	5 M	CO4	L4
(b)	Explain the concept of the Cloud Shared Responsibility Model.	5 M	CO4	L2
<b>(OR)</b>				
9.	Describe the federated clouds concept and discuss why interoperability is crucial for modern cloud environments.	10 M	CO4	L2
10(a)	Compare and contrast Edge Computing and Fog Computing, using their typical architectural roles.	5 M	CO5	L2
(b)	Differentiate between AWS Lambda and EC2.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Differentiate between Function-as-a-Service (FaaS) and Server less platforms.	5 M	CO5	L2
(b)	Outline the various phases of the DevOps Life Cycle.	5 M	CO5	L2

**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23EC12-DIGITAL SYSTEM DESIGN THROUGH HDL**

(ECE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL																
1(a)	Define sized and unsized number in Verilog.	2M	CO1	L1																
(b)	Write a Verilog code for 2×1 Multiplexer using gate level instantiation.	2M	CO2	L2																
(c)	Explain types of structured procedural statement in Verilog HDL with example.	2M	CO2	L1																
(d)	Differentiate blocking and non-blocking statement.	2M	CO3	L1																
(e)	X=4'b1010 and Y=4'b1101, Calculate the result for bitwise and operator.	2M	CO3	L2																
(f)	Develop a half adder using dataflow modelling in verilog.	2M	CO3	L2																
(g)	Define User-Defined Primitive (UDP).	2M	CO1	L1																
(h)	Describe synthesis in HDL design flow.	2M	CO1	L1																
(i)	Mention two advantages of assertion-based verification (ABV).	2M	CO4	L1																
(j)	What is the role of stimulus generation in a testbench?	2M	CO4	L1																
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>																
2(a)	Develop a 4-bit binary up-counter using Gate level modeling with circuit diagram.	5M	CO2	L3																
(b)	Discuss various data types used in Verilog HDL with examples.	5M	CO1	L2																
<b>(OR)</b>																				
3(a)	Design a SR Latch using Verilog HDL with following delay specifications. <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">Min</td> <td style="text-align: center;">Typ</td> <td style="text-align: center;">Max.</td> </tr> <tr> <td style="padding-right: 20px;">Rise Time</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="padding-right: 20px;">Fall Time</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> </tr> <tr> <td style="padding-right: 20px;">Turn off</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> </tr> </table>		Min	Typ	Max.	Rise Time	1	2	3	Fall Time	3	4	5	Turn off	5	6	7	5M	CO3	L3
	Min	Typ	Max.																	
Rise Time	1	2	3																	
Fall Time	3	4	5																	
Turn off	5	6	7																	
(b)	Explain the blocking and non-blocking procedural assignment statements with examples.	5M	CO1	L2																
4.	Develop a 3:8 Decoder using Gate level modeling with circuit diagram.	10M	CO2	L3																
<b>(OR)</b>																				
5(a)	Describe the use of if-else and case statements in behavioral modelling.	5M	CO1	L2																
(b)	Write a behavioral Verilog code for a JK flip-flop and explain how it operates.	5M	CO2	L3																
6(a)	Apply switch level modeling to design a 2-input NAND gate and show the output with the help of test bench.	5M	CO3	L3																
(b)	Describe various path delay models using necessary examples.	5M	CO1	L2																
<b>(OR)</b>																				
7(a)	Write a Verilog code for Edge trigger D-FF dataflow modeling.	5M	CO3	L3																
(b)	List 5 different types of operators in Verilog HDL coding with examples.	5M	CO3	L1																
8(a)	Differentiate Moore and Mealy state machine with examples.	5M	CO2	L2																
(b)	Write a Verilog code to generate one hot code from 4-bit binary number.	5M	CO3	L3																
<b>(OR)</b>																				
9.	Design a simple FSM to detect the sequence "1011" with state diagram and write its Verilog model.	10M	CO3	L3																
10(a)	Write a code to test a sequential circuit of your choice.	5M	CO4	L3																
(b)	Categorize different verification levels—unit, integration, and system-level verification.	5M	CO4	L2																
<b>(OR)</b>																				
11(a)	Describe the structure and working of a typical Verilog testbench with example.	5M	CO4	L2																
(b)	Illustrate assertion verification with suitable examples.	5M	CO4	L2																

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram – 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23EC27-COMMUNICATION SYSTEMS**

(EEE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define modulation and explain its need.	2M	CO1	L2
(b)	Define modulation index for AM.	2M	CO1	L1
(c)	What is the difference between direct and indirect methods of FM generation?	2M	CO2	L2
(d)	Mention two advantages of FM over AM.	2M	CO2	L2
(e)	Differentiate between low-level and high-level AM transmitters.	2M	CO3	L2
(f)	Define intermediate frequency (IF).	2M	CO3	L1
(g)	Explain aliasing.	2M	CO4	L2
(h)	Distinguish between PWM and PPM.	2M	CO2	L2
(i)	Differentiate between ASK and FSK.	2M	CO2	L2
(j)	Define ASK.	2M	CO1	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	Explain the generation of SSB using the phase-shift method.	5M	CO1	L2
(b)	An AM transmitter has an un-modulated carrier power of 10KW. Find the total transmitted power when the modulation index is (i) 10% (ii) 50% (iii) 100%.	5M	CO4	L3
<b>(OR)</b>				
3(a)	A carrier of frequency 100 kHz and amplitude 10 V is amplitude-modulated by a sinusoidal signal of frequency 1 kHz and amplitude 4 V. Find the modulation index, sideband frequencies, and total power.	5M	CO4	L3
(b)	Draw and explain the block diagram of a basic communication system.	5M	CO1	L2
4(a)	Discuss the concept of modulation index in FM .	5M	CO2	L2
(b)	Describe the operation of a balanced slope detector with neat diagram.	5M	CO1	L2
<b>(OR)</b>				
5(a)	Explain the Foster-Seeley discriminator and its limitations.	5M	CO2	L2
(b)	An FM signal has a deviation ratio of 10 and maximum modulating frequency of 15 kHz. Find the transmission bandwidth using Carson's rule.	5M	CO4	L3
6.	Define and classify noise. Explain various types of internal noise and external noise.	10M	CO4	L2
<b>(OR)</b>				
7(a)	Discuss the working of a superheterodyne receiver and list its advantages.	5M	CO3	L2
(b)	A superheterodyne receiver has a local oscillator frequency of 1.02 MHz and an intermediate frequency (IF) of 455 kHz. Find the signal frequency.	5M	CO4	L3
8(a)	Describe the demodulation of PAM signals.	5M	CO1	L2
(b)	If a PAM system uses a 10 kHz sampling frequency and message up to 4 kHz, find the Nyquist rate.	5M	CO4	L3
<b>(OR)</b>				
9(a)	Describe the generation of PWM signals.	5M	CO1	L2
(b)	State and prove the sampling theorem for low-pass signals.	5M	CO1	L2
10(a)	A delta modulation system has a sampling frequency of 64 kHz and step size of 0.25 V. Find the maximum slope of the input signal that can be tracked.	5M	CO4	L3
(b)	Explain the working principle of amplitude shift keying (ASK) with block diagram.	5M	CO2	L2
<b>(OR)</b>				
11(a)	Discuss Delta modulation in detail with suitable diagrams.	5M	CO2	L2
(b)	Explain adaptive delta modulation and show how it improves performance.	5M	CO4	L2

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**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**

L.B.Reddy Nagar :: Mylavaram - 521 230 :: NTR Dist. :: A.P.

B.Tech. (V Semester) Regular Examinations

**23ME16-INDUSTRIAL ROBOTICS**

(ME)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is work volume in Robotics	2 M	CO1	L1
(b)	Why stepper motor is preferred in Robotic control?	2 M	CO1	L2
(c)	What is a feedback component?	2 M	CO2	L1
(d)	Enumerate the proximity sensors used in robots.	2 M	CO2	L1
(e)	Explain the use of homogenous transformation.	2 M	CO3	L2
(f)	Why is D-H notation important in robot kinematics?	2 M	CO3	L2
(g)	What is skew motion in path planning of robot?	2 M	CO4	L1
(h)	List any 2 Robotics commands and their use.	2 M	CO4	L1
(i)	Mention the steps involved in image processing.	2 M	CO5	L1
(j)	What is the role of vision sensor?	2 M	CO5	L1
<b>Q.No</b>	<b>All questions carry equal marks</b>	<b>Marks</b>	<b>CO</b>	<b>BL</b>
2(a)	With neat diagrams, explain the different types of robotic joints – Prismatic, Rotational, Twisting, and Revolving – indicating their motion and notation.	5 M	CO1	L2
(b)	Express the working principles of the following grippers with suitable sketches: (i) Magnetic grippers (ii) Vacuum cup grippers	5 M	CO1	L3
<b>(OR)</b>				
3(a)	Summarize the considerations in the design of mechanical grippers for a Robotic arm.	5 M	CO1	L2
(b)	Describe the components of a robotic system.	5 M	CO1	L2
4(a)	Specify the characteristics of an actuating System used in robotics.	5 M	CO2	L2
(b)	Explain the working principle of an LVDT (Linear Variable Differential Transformer) and discuss its applications in robotic motion control.	5 M	CO2	L2
<b>(OR)</b>				
5(a)	Explain the working principle of potentiometers used to sense the position of robotic joint.	5 M	CO2	L3
(b)	Differentiate between absolute and incremental encoders. How does each type affect the precision and reliability of robotic positioning?	5 M	CO2	L3
6.	A point $P(7,3,1)^T$ is attached to a frame $F_{noa}$ and is subjected to the following transformations. Find the coordinates of the point relative to the reference frame at the conclusion of transformations. (i) Rotation of $90^\circ$ about the a-axis, (ii) Then a translation of $[4,-3,7]$ along n,o,a axes, (iii) Followed by a rotation of $90^\circ$ about the o-axis.	10M	CO3	L3
<b>(OR)</b>				
7.	Determine the transformation matrix T that represents a translation of 'a' units along x-axis, followed by a rotation of $\beta$ about x-axis and followed by a rotation of $\theta$ about z-axis.	10M	CO3	L4
8.	A single cubic trajectory for the motion of a robot end-effector is given by: by $q(t) = 10 + 4t^2 - 2t^3$ . The motion occurs over a period of 4 seconds ( $0 \leq t \leq 4$ ). (i) Determine the starting and final position, velocity, and acceleration of the end-effector (ii) Obtain the expressions for velocity and acceleration as functions of time (iii) Plot the variation of position, velocity, and acceleration with respect to time for $0 \leq t \leq 4$ (iv) Interpret the physical significance of the results based on the graphs.	10M	CO4	L3
<b>(OR)</b>				
9(a)	Compare and contrast joint-space and Cartesian-space trajectory planning.	5 M	CO4	L3
(b)	Demonstrate how a robot manipulator can generate a collision-free trajectory in an environment with obstacles using suitable trajectory planning techniques	5 M	CO4	L3
10(a)	Discuss in detail the role machine vision in robotics.	5 M	CO5	L2
(b)	Illustrate the sensing and digitizing function in robotics.	5 M	CO5	L2
<b>(OR)</b>				
11(a)	Describe the process of training the vision systems.	5 M	CO5	L2
(b)	Explain the applications of robots in the industries today.	5 M	CO5	L2