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. (IV Semester) (R23) Semester End Examinations (Supplementary) – December 2025

R23

TIME TABLE

Time : 02.00 P.M. to 05.00 P.M. **A.Y. : 2025-26**

Branch	02-12-2025 (Tuesday)	03-12-2025 (Wednesday)	04-12-2025 (Thursday)	05-12-2025 (Friday)	06-12-2025 (Saturday)
AI & DS	23HS02-Managerial Economics and Financial Analysis	23AD01-Statistical Methods for Data Science	23AD02-Artificial Intelligence	23AD03-Introduction to Data Science	23IT01-Digital Logic & Computer Organization
ASE	23HS03-Industrial Management	23FE13-Complex Variables, Probability and Statistics	23AE04-Materials and Manufacturing Technology	23AE05-Solid Mechanics	23AE06-Aerodynamics
CE	23HS02-Managerial Economics and Financial Analysis	23CE04-Engineering Geology	23CE05-Concrete Technology	23CE06-Structural Analysis	23CE07-Hydraulics & Hydraulic Machinery
CSE	23HS02-Managerial Economics and Financial Analysis	23FE10-Probability & Statistics	23CS06-Operating Systems	23CS03-Database Management Systems	23IT02-Software Engineering
CSE (AI&ML)	23ME09-Optimization Techniques	23FE10-Probability & Statistics	23AM01-Machine Learning	23CS03-Database Management Systems	23IT01-Digital Logic & Computer Organization
ECE	23HS02-Managerial Economics and Financial Analysis	23EE09-Control Systems	23EC05-Electromagnetic Waves and Transmission Lines	23EC06-Electronic Circuit Analysis	23EC07-Analog Communications
EEE	23HS02-Managerial Economics & Financial Analysis	23EE09-Control Systems	23EE06-Analog Circuits	23EE07-Power Systems-I	23EE08-Induction and Synchronous Machines
IT	23ME09-Optimization Techniques	23FE10-Probability & Statistics	23CS06-Operating Systems	23CS03-Database Management Systems	23IT02-Software Engineering
ME	23HS03-Industrial Management	23FE13-Complex Variables, Probability and Statistics	23ME06-Manufacturing Processes	23ME07-Fluid Mechanics & Hydraulic Machines	23ME08-Theory of Machines

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

Date: 14-11-2025

CONTROLLER OF EXAMINATIONS

PRINCIPAL

Copy to: 1. Vice-Principal, Deans & HoDs 2. T&P cell, Transport in-charge & Librarian
3. Canteen, PD, Security & Hostels 4. Coordinator-Disciplinary 5. Notice Boards

H.T.No | | | | | | | | | | |

02 DEC 2025

R23

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23HS02-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(AI&DS,CE,CSE,ECE and EEE)

Time : 3 hours | Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	State the concept of the law of demand.	2M	CO1	L1
(b)	Define the term elastic.	2M	CO1	L1
(c)	What is the variable cost? Give an example.	2M	CO2	L1
(d)	Define the term isoquant.	2M	CO2	L1
(e)	What is penetration pricing?	2M	CO3	L1
(f)	What are the key features of a monopoly?	2M	CO3	L1
(g)	What is working capital?	2M	CO4	L1
(h)	Recall the term Payback Period.	2M	CO4	L1
(i)	Define the term liquidity.	2M	CO5	L1
(j)	State the concept of current ratio.	2M	CO5	L1

Q.No	All questions carry equal marks	Marks	CO	BL
2.	Define elasticity of demand and explain different types of elasticity of demand with neat graphs.	10M	CO1	L2
	(OR)			
3(a)	Define Managerial economics and explain its nature and scope.	5M	CO1	L2
(b)	Explain various determinants of demand for a product.	5M	CO1	L2
4.	From the given data, calculate the following: **Year** | **Sales (₹)** | **Profit (₹)** 2023 | 1,80,000 | 30,000 2024 | 2,60,000 | 50,000 Calculate the following: (i) P/V Ratio (ii) Fixed Costs (iii) Break-Even Sales (iv) Expected Profit if Sales are ₹1,00,00.	10M	CO2	L3
	(OR)			
5(a)	Describe the concept of isocost with suitable diagrams.	5M	CO2	L2
(b)	Discuss any five cost concepts along with suitable examples.	5M	CO2	L2
6(a)	Discuss the characteristics of a monopoly and how it differs from other market structures.	5M	CO3	L2
(b)	Discuss penetration pricing and price skimming with real-world examples.	5M	CO3	L2
	(OR)			
7(a)	Compare and contrast perfect competition and monopoly.	5M	CO3	L2
(b)	Explain Monopolistic Competition and its features.	5M	CO3	L2
8(a)	What are the different sources of capital available for business expansion?	5M	CO4	L2
(b)	Define capital budgeting and explain its process.	5M	CO4	L2
	(OR)			

<table>
<tr><td>9.</td><td>XYZ Ltd. is evaluating a project requiring an initial investment of ₹5,00,000. The expected Cash Flows After Tax (CFAT) over 5 years are as follows:
<table>
<tr><th>Year</th><th>CFAT (₹)</th></tr>
<tr><td>1</td><td>1,20,000</td></tr>
<tr><td>2</td><td>1,30,000</td></tr>
<tr><td>3</td><td>1,50,000</td></tr>
<tr><td>4</td><td>1,40,000</td></tr>
<tr><td>5</td><td>1,60,000</td></tr>
</table>
The Discount rate is 10%.
Required to calculate
• Net Present Value
• Profitability Index
• Internal Rate of Return</td><td>10M</td><td>CO4</td><td>L3</td></tr>
<tr><td>10.</td><td>XYZ Enterprises had the following transactions during the month of April 2024. Prepare the journal entries for each transaction:
<table>
<tr><td>Date</td><td>Transaction Details</td><td>Amount (₹)</td></tr>
<tr><td>April 1</td><td>Business started with cash</td><td>4,00,000</td></tr>
<tr><td>April 4</td><td>Purchased goods for cash</td><td>1,50,000</td></tr>
<tr><td>April 7</td><td>Sold goods for cash</td><td>90,000</td></tr>
<tr><td>April 10</td><td>Purchased machinery for business</td><td>50,000</td></tr>
<tr><td>April 14</td><td>Paid office rent</td><td>12,000</td></tr>
<tr><td>April 18</td><td>Paid wages to workers</td><td>20,000</td></tr>
<tr><td>April 22</td><td>Sold goods on credit to ABC Ltd.</td><td>70,000</td></tr>
<tr><td>April 25</td><td>Received cash from ABC Ltd.</td><td>50,000</td></tr>
<tr><td>April 28</td><td>Paid telephone bill</td><td>3,000</td></tr>
</table></td><td>10M</td><td>CO5</td><td>L3</td></tr>
<tr><td colspan="5">(OR)</td></tr>
<tr><td>11(a)</td><td>The following balances were extracted from the books of ABC Ltd. on March 31, 2024. Prepare a Trial Balance.
<table>
<tr><td>Account Name</td><td>Amount (₹)</td></tr>
<tr><td>Capital</td><td>3,00,000</td></tr>
<tr><td>Cash in Hand</td><td>50,000</td></tr>
<tr><td>Cash at Bank</td><td>1,20,000</td></tr>
<tr><td>Purchases</td><td>1,80,000</td></tr>
<tr><td>Sales</td><td>2,50,000</td></tr>
<tr><td>Rent Paid</td><td>20,000</td></tr>
<tr><td>Salaries</td><td>30,000</td></tr>
<tr><td>Wages</td><td>15,000</td></tr>
<tr><td>Machinery</td><td>90,000</td></tr>
<tr><td>Furniture</td><td>60,000</td></tr>
<tr><td>Debtors</td><td>40,000</td></tr>
<tr><td>Creditors</td><td>55,000</td></tr>
<tr><td>Bills Payable</td><td>25,000</td></tr>
<tr><td>Bills Receivable</td><td>35,000</td></tr>
</table></td><td>5M</td><td>CO5</td><td>L3</td></tr>
<tr><td>(b)</td><td>Elucidate the different types of ratios used in financial analysis.</td><td>5M</td><td>CO5</td><td>L2</td></tr>
</table>

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23HS03-INDUSTRIAL MANAGEMENT

(ASE & ME)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define Industrial Engineering and its significance.	2M	CO1	L1
(b)	Explain the concept of productivity measurement.	2M	CO1	L2
(c)	Explain work study in short.	2M	CO2	L2
(d)	Mention two industries where job production is commonly used.	2M	CO2	L1
(e)	What is an S-chart and how is it different from an $\bar{R}$-chart?	2M	CO3	L1
(f)	What is the Zero Defect Concept?	2M	CO3	L1
(g)	What is Financial Management?	2M	CO4	L1
(h)	Define Payback Period.	2M	CO4	L1
(i)	Why is Job Evaluation important?	2M	CO5	L1
(j)	What is Enterprise Resource Planning (ERP)?	2M	CO5	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain Taylor's scientific management principles.	5M	CO1	L2
(b)	Discuss preventive and breakdown maintenance in plant management.	5M	CO1	L2
	(OR)			
3(a)	Discuss the quantitative tools of IE and productivity measurement.	5M	CO1	L3
(b)	Differentiate between product and process layouts.	5M	CO1	L2
4(a)	Explain various techniques used for time measurement in time study.	5M	CO2	L2
(b)	Demonstrate two hand process charts with a neat sketch.	5M	CO2	L2
	(OR)			
5(a)	Demonstrate basic procedure involved in Method study.	5M	CO2	L2
(b)	Describe the procedure of MTM (Methods-Time Measurement) in Work Study.	5M	CO2	L2
6(a)	Explain the construction and interpretation of an $\bar{X}$ (X-bar) control chart.	5M	CO3	L3
(b)	Describe the steps involved in implementing Total Quality Management (TQM) in an organization.	5M	CO3	L2
	(OR)			
7.	You are given the values of sample means ($\bar{X}$) and ranges(R) for 10samples of size 5 each. Draw charts for the means ($\bar{X}$) and ranges(R). comment on the state of control of the process. For n=5, A2 = 0.577, D3 = 0, D4 = 2.114.	10M	CO3	L3
8(a)	Outline various sources of finance in business.	5M	CO4	L3
(b)	A company is evaluating a project that costs ₹2,00,000 and provides cash inflows of ₹60,000 per year for 5 years. The required rate of return is 12%. Compute the Internal Rate of Return (IRR) and Payback Period.	5M	CO4	L2
	(OR)			
9.	A company plans to invest ₹1,80,000 in a project with annual cash inflows of ₹50,000 for 4 years. The discount rate is 11%. Calculate the following: (i) Net Present Value (NPV) (ii) Profitability Index (PI) (iii) Payback Period (iv) Accounting Rate of Return (ARR)	10M	CO4	L3
10(a)	Differentiate between Human Resource Management (HRM) and Personnel Management.	5M	CO5	L2
(b)	Demonstrate the implementation of Value Engineering in organizations.	5M	CO5	L2
	(OR)			
11(a)	Summarize any two quantitative methods used in Merit Rating.	5M	CO5	L2
(b)	Explain the major components of an ERP system.	5M	CO5	L2

Sample	1	2	3	4	5	6	7	8	9	10
$\bar{X}$	43	49	40	44	45	38	51	46	42	43
R	5	6	5	7	6	4	8	6	4	6

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23ME09-OPTIMIZATION TECHNIQUES

(CSE(AI&ML) and IT)

Time : 3 hours Max. Marks :70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Summarize the conditions to find the extreme/stationary points of a Multivariable objective function without constraints.	2M	CO1	L2
(b)	If the objective function and the constraint equations have three decision/design variables, then specify the dimensions of cost vector and the constraint matrix.	2M	CO1	L1
(c)	Mention the number of basic solutions with n variables and m constraint equations, also find the number of basic solutions for the case with 3 equality constraint equations and 4 variables in a LPP.	2M	CO2	L2
(d)	In a given LPP, If there are 2 greater than and 2 less than inequality constraint equations then Find the number of slack and surplus variables to transform the inequality constraint equations to equality constraint equations.	2M	CO2	L1
(e)	List out the methods to obtain basic feasible solutions of a balanced transportation problem.	2M	CO3	L1
(f)	What are the number of basic variables in LPP generated by a transportation model with m-sources and n-destinations, also calculate the number of basic variables for the case with 3-sources and 4-destinations.	2M	CO3	L2
(g)	Mention the direct search methods for finding optimal solution of a one-dimensional non-linear objective function.	2M	CO4	L1
(h)	If a nonlinear programming/constrained optimization problem 'N' objective functions, 'J' Inequality constraints and 'K' Equality constraint equations then calculate the total number of Khun-Tucker conditions.	2M	CO4	L1
(i)	Write any TWO similarities between linear and dynamic programming problem.	2M	CO5	L1
(j)	Define the "Principle of Optimality" in dynamic programming, which applicable to sequential processes.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Classify the optimization problems based on number of objective functions, also represent those models.	5M	CO1	L2
(b)	Find the point at which the function $f(x_1, x_2, x_3) = -{x_1}^2 - {x_2}^2 - {x_3}^2 + x_1x_2 + x_1 + 2x_3$ has optimal values.	5M	CO1	L3
	(OR)			
3(a)	Illustrate the Graphical method of solution of LPP.	5M	CO1	L3
(b)	Find the stationary/extreme points of the function $u = 20x_1 + 26x_2 + 4x_1x_2 - 4x_1^2 - 3x_2^2$	5M	CO2	L3
4.	Describe the Simplex algorithm for solution of linear programming problem.	10M	CO2	L2
	(OR)			

5(a)	Solve the system of equations into canonical form using pivot operations, Find the Basic Solution $4x_1 - 7x_2 + 2x_3 = -8$ $3x_1 + 4x_2 - 5x_3 = -8$ $5x_1 + x_2 - 8x_3 = -34$	5M	CO2	L3
(b)	Solve the linear programming problem using graphical method $Max\, f(x_1, x_2) = 2x_1 - 4x_2$ $S.T \quad 3x_1 + 5x_2 \geq 15$ $4x_1 + 9x_2 \leq 36$ $x_1, x_2 \geq 0$	5M	CO2	L3
6.	Find the Optimal solution (i.e the number/quantity of commodity to be transported from source to destination) for the given balanced transportation problem.	10M	CO3	L3

Destinations / Sources	D1	D2	D3	D4	Availability/ Supply
S1	5	2	4	3	30
S2	6	4*	9	5	40
S3	2	3	8	1	55
Requirements/ Demands	15	20	40	50	125

* The cost of transportation charges mentioned in the table.

(OR)

7(a)	Illustrate the Least cost entry method, procedure of finding basic feasible solution for a given balanced transportation problem.	5M	CO3	L3
(b)	Illustrate the Vogel's Approximation method, procedure of finding basic feasible solution for a given balanced transportation problem.	5M	CO3	L2
8(a)	Find the minimum of $x^2 - 2x, 0 < x < 1.5$ within the interval of uncertainty 0.25 L_0, Where L_0 is the original interval of uncertainty.	5M	CO4	L3
(b)	Illustrate the univariate search method to find the minimum value of the multi-dimensional function $f(x_1, x_2) = x_1^2 - x_1x_2 + 3x_2^2$	5M	CO4	L3

(OR)

9(a)	Find the minimum value of the function $f(x_1, x_2) = x_1^2 - x_1x_2 + 3x_2^2$, given initial starting point as $X_0 = [1\ 2]^T$ using steepest descent method.	5M	CO4	L3
(b)	Elaborate the following (i) constrained optimization (ii) feasible point (iii) Infeasible point (iv) Active constraint (v) Inactive constraint	5M	CO4	L2
10(a)	Find three non-negative real numbers such that the sum of squares of these is minimum with the restriction that their sum is not less than 30, using the principle of optimality.	5M	CO5	L2
(b)	Illustrate the principle of optimality for decision making by splitting up into series of stages and optimal decisions be taken sequentially.	5M	CO5	L2

(OR)

11.	Illustrate the Backward Dynamic programming for finding the minimum/shortest path from city-A to I, for the map with various routes going from A to I with distances marked on them, with four stages and State-0 with city (I), state-1 having 2-cities (G & H), State-2 cities (D, E & F), State-3 cities (B & C), State-4 city (A).	10M	CO5	L2

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23AD01-STATISTICAL METHODS FOR DATA SCIENCE

(AI&DS)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is Explanatory Data Analysis?	2M	CO1	L2
(b)	Define Exponential distribution.	2M	CO1	L1
(c)	Define sample and population in the context of statistical analysis.	2M	CO2	L1
(d)	If $\bar{x} = 20, \mu = 16, \sigma = 4$ *and* $n = 36$, then calculate the test statistic Z.	2M	CO2	L2
(e)	Define Positive and Negative correlation with an example.	2M	CO3	L2
(f)	How to fit a multiple regression equation if one of the independent variables is categorical variable?	2M	CO3	L2
(g)	Write the methods for determining Seasonal variations in time series.	2M	CO4	L1
(h)	Fit a trend line by the freehand (Graphical) method for the given data. Year: 2001, 2002, 2003, 2004, 2005, 2006 Sales: 30, 46, 25, 59, 40, 60	2M	CO4	L2
(i)	How does logistic regression differ from linear regression?	2M	CO5	L2
(j)	Calculate the value of x_1 when $\text{logit}(p) = 2.5$ using the logistic regression equation: $\text{logit}(p) = -5 + 0.75\,x_1$.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Describe the importance of Statistical methods in data science and discuss few statistical methods used in data science.	5M	CO1	L2
(b)	The probability of a newly generated virus will attack the computer system and corrupt the file open 1/5. If 6 files are opened, calculate the probability that (i) At least 2 files will be corrupted by the virus (ii) All the files will be safe.	5M	CO1	L3
	(OR)			
3(a)	If X follows Poisson distribution such that $\frac{3}{2}P(X=1) = P(X=3)$, Determine (i) Mean λ (ii)$P(X \geq 1)$ and (iii) $P(X \leq 2)$.	5M	CO1	L3
(b)	The time required to assemble a piece of machinery is a random variable follows normal distribution with mean 12.0 minutes and standard deviation 2.0 minutes. What is the probability that the assembly of a piece of machinery of this kind will take (i) More than 11.5 minutes? (ii) Between 11.0 and 14.8 minutes?	5M	CO1	L3
4(a)	Describe the steps involved in testing the Hypothesis.	5M	CO3	L2
(b)	A researcher wants to know the intelligence of students in a school. He selected two groups of students. In the first group there are 150 students having mean IQ of 75 with a S.D of 15, in the second group there are 250 students having mean IQ of 70 with S.D of 20. Is there a significant difference between the Means of two groups? (test at 0.05 level of significance).	5M	CO3	L4
	(OR)			
5(a)	If the mean age at death of 64 men engaged in an occupation is 56·4 years with standard deviation of 10·2 years, Estimate the 95% and 98% confidence limits for the mean age at death of all men in that population.	5M	CO3	L3
(b)	The blood pressure of 5 women before and after intake of a certain drug is given below. Test whether there is significant change in blood pressure at 1% Level of Significance. Before: 110, 120, 125, 132, 125 After: 120, 118, 125, 136, 121	5M	CO3	L4
6(a)	The equations of two regression lines obtained in a correlation analysis are as follows: 3X + 12Y = 19, 3Y + 9X = 46 Obtain (ii) mean values of X and Y, (ii) Correlation coefficient.	5M	CO4	L3

(b)	Fit a straight-line $y = a + bx$ to the following data by the method of least squares. x: 0, 1, 3, 6, 8 y: 1, 3, 2, 5, 4	5M	CO3	L3
	(OR)			
7.	Determine the Multiple regression equation to estimate the Sales (in lakhs) (y) depending on the expenditure (in lakhs) of TV advertising (x_1) and Paper Advertising (x_2) of a company from the following data. Hence estimate the Sales when the TV advertising cost is 8 lakhs and Paper advertising cost is 5 lakhs. *Observation* | x_1 (TV Advertising) | x_2 (Paper Advertising) | y (Sales) *1* | 5 | 2 | 20 *2* | 6 | 3 | 22 *3* | 4 | 5 | 21 *4* | 6 | 4 | 25 *5* | 7 | 6 | 27	10M	CO3	L3
8(a)	Define Time series and explain the components of a time series.	5M	CO4	L2
(b)	Calculate three-yearly moving averages of number of students studying in a higher secondary school in a particular village from the following data. Year: 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010 No. of Students: 332, 317, 357, 392, 402, 405, 410, 427, 435, 438	5M	CO4	L3
	(OR)			
9.	The data given below is the occupancy rate of a hotel across the four quarters for four years (2019-2022). Calculate the seasonal variation indices by the method of Link Relatives. Occupancy Rate (%) *Quarter* | 2019 | 2020 | 2021 | 2022 *Q1* | 60 | 65 | 70 | 75 *Q2* | 80 | 85 | 90 | 95 *Q3* | 85 | 90 | 95 | 100 *Q4* | 70 | 75 | 80 | 85	10M	CO4	L3
10(a)	What is "residual deviance" in logistic regression, and how can it be used to evaluate the model's fit?	5M	CO5	L4
(b)	A bank uses logistic regression to predict whether a loan application will be approved (1) or rejected (0) based on a person's income (in "000) (x_1)and credit score (x_2). The logistic regression equation is: $\log(odds)(z) = -5 + 0.03\,x_1 + 0.0065\,x_2$ Determine the probability of loan approval for a person with (i) $x_1 = 50$ $x_2 = 680$ and (ii) $x_1 = 45$ $x_2 = 700$. Then classify whether the loan will be approved or not. (Use a threshold of 0.7).	5M	CO5	L3
	(OR)			
11(a)	An email service uses logistic regression to predict whether an email is spam (1) or not (0) based on the number of spammy keywords (x_1) in the email. The logistic regression equation is: $\text{logit}(p) = -3 + 0.1\,x_1$. Determine the minimum number of spammy keywords should an email contain to have a greater than 90% chance of being flagged as spam.	5M	CO5	L3
(b)	Describe the confusion matrix and its components in the context of logistic regression.	5M	CO5	L2

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03 DEC 2025

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23FE13-COMPLEX VARIABLES, PROBABILITY AND STATISTICS

(ASE & ME)

Passed 3/12/25

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Verify that the function $f(z)=xy+iy$ is analytic or not.	2M	CO1	L2
(b)	Find the real and imaginary parts of the function $f(z)=z^3$.	2M	CO1	L2
(c)	Find the poles of the function $f(z)=\frac{e^z}{z^2+\pi^2}$.	2M	CO2	L2
(d)	Write Laurent's series expansion formula.	2M	CO2	L1
(e)	Define the binomial distribution and write the binomial parameters.	2M	CO3	L1
(f)	What is the standard normal distribution?	2M	CO3	L1
(g)	Find the finite population correction factor for a sample size of 20 taken from a population of 200.	2M	CO4	L2
(h)	A researcher selects a random sample of 100 observations from a population with a standard deviation of 30. Determine the standard error.	2M	CO4	L2
(i)	Define critical region and level of significance.	2M	CO5	L1
(j)	If $n_1=8, n_2=10$ and $\sum(x_i-\bar{x})^2=84.4, \sum(y_i-\bar{y})^2=102.6$ then find the test statistic t.	2M	CO5	L2

Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Apply Milne-Thomson method to construct the analytic function *f(z) = u+iv* whose real part is $u=3x^2y+2x^2-y^3-2y^2$.	5M	CO1	L3
(b)	Find the conjugate of the harmonic function $u=\frac{x}{x^2+y^2}$.	5M	CO1	L3
	(OR)			
3(a)	Applying Cauchy' Integral formula evaluate $\int_C \frac{e^{5z}}{(z-1)(z-2)}dz$ where C is $\lvert z\rvert=3$	5M	CO1	L3
(b)	Apply generalized Cauchy's Integral formula to evaluate $\int_C \frac{\log z}{(z-1)^3}dz$ where C is $\lvert z-1\rvert=\frac{1}{2}$	5M	CO1	L3
4(a)	Find Laurent series expansion of $\frac{1}{z^2-3z+2}$ for the region $1<\lvert z\rvert<2$	5M	CO2	L3
(b)	Applying Taylor's theorem expand the function $f(z)=\frac{z-1}{z+1}$ about the point $z=1$.	5M	CO2	L3
	(OR)			
5(a)	Find the poles of the function $f(z)=\frac{z^2}{(z-1)^2(z+2)}$ and the residue at each pole.	5M	CO2	L3
(b)	Apply Residue theorem to evaluate $\oint_C \frac{4-3z}{z(z-1)(z-2)}dz$ where C is the circle $\lvert z\rvert=3/2$.	5M	CO2	L3

6(a)	Of the three men, the chances that a politician, a business man or an academician will be appointed as a vice-chancellor (V.C) of a university are 0.5, 0.3, and 0.2 respectively. Probability that research is promoted by these persons if they are appointed as V.C is 0.3, 0.7, and 0.8 respectively. Determine the probability that research is promoted. If research is promoted, what is the probability that V.C is an academician?	5M	CO3	L3
(b)	A random variable X has the following probability function $X=x$: −3, −2, −1, 0, 1, 2, 3 $P(X=x)$: k, 0.1, k, 0.2, $2k$, 0.4, $2k$ Determine (i) k (ii) mean (iii) variance	5M	CO3	L3
	(OR)			
7(a)	Out of 800 families with 5 children each, how many family would you expect to have (i) exactly 3 boys (ii) 5 girls (iii) at least one boy.	5M	CO3	L3
(b)	For a normally distributed variate 'x' with mean 30 and standard deviation 5, find the probabilities (i) P($26 \leq X \leq 40$) (ii) P($X \geq 45$)	5M	CO3	L3
8.	A population consists of five numbers 2, 4, 6, 8 and 10. Consider all possible samples of size two which can be drawn without replacement from this population. Find (*i*) mean of the population (*ii*) standard deviation of the population (*iii*) mean of the sampling distribution of means (*iv*) standard deviation of the sampling distribution of means.	10M	CO4	L3
	(OR)			
9(a)	A random sample of size 64 is taken from an infinite population having the mean 45 and the standard deviation 8. What is the probability that $\bar{x}$ will be between 46 and 47.5.	5M	CO4	L3
(b)	The mean and the standard deviation of a population are 11.795 and 14.054 respectively. If n=50, find 95% confidence interval for the mean.	5M	CO4	L3
10(a)	An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes .Test the claim at 0.05 level.	5M	CO5	L3
(b)	A sample of 64 students has a mean weight of 70kg. Can we assume that this sample is taken from population with mean weight 56kg and standard deviation 25kg.	5M	CO5	L3
	(OR)			
11(a)	Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level.	5M	CO5	L3
(b)	A reading test results are given for two groups of an elementary school class children. One group consists of 12 Anglo-American children with mean 74 and standard deviation 8. Another group consists of 10 Mexican American children with mean 70 and standard deviation 10. Is the difference between the means of the two groups significant at 5% level of significance?	5M	CO5	L3

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R23

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23CE04-ENGINEERING GEOLOGY

(CE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Recognize Quartz and Dimond number in Moh's scale of Hardness.	2M	CO1	L1
(b)	Identify the name of the part of a fold that lies between crest and trough.	2M	CO1	L1
(c)	List out the subdivisions in geology.	2M	CO2	L1
(d)	Describe the main processes involved in the formation of metamorphic rocks.	2M	CO2	L1
(e)	Define the terms: anticlines and synclines.	2M	CO3	L1
(f)	What is Porosity and Permability?	2M	CO3	L1
(g)	Define seismology.	2M	CO2	L1
(h)	Recognize the name of the rock that has formed because of metamorphism of Limestone.	2M	CO2	L1
(i)	Identify the structural features of tunnel sites.	2M	CO4	L2
(j)	Listout their advantages of tunnel and dam.	2M	CO4	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain engineering problem of marine errosion and deposition.	5M	CO1	L2
(b)	Interpret biological weathring process with examples.	5M	CO1	L2
	(OR)			
3(a)	Disuss the diffrent branches of geology with reference to Civil Engineering.	5M	CO1	L2
(b)	Describe the weathring of rocks and its importance from the Civil Engineering point of view.	5M	CO1	L2
4.	Explain the formation of sedimentary rocks.	10M	CO2	L2
	(OR)			
5(a)	List the various physical properties of minerals through which they are identified.	5M	CO2	L2
(b)	Desribe the Rock forming minerals. Outline their importance in civil engineering point of view.	5M	CO2	L2
6(a)	Interpret the following with figures: (i) Syncline (ii) Oblique slip fault.	5M	CO3	L2
(b)	Differentiate between normal fault and reverse fault.	5M	CO3	L2
	(OR)			
7(a)	Discuss about joints in geological structure.	5M	CO3	L2
(b)	Describe the parts of a FAULT with a neat sketech.	5M	CO3	L2
8(a)	Explain the various types of landslides can be classified.	5M	CO4	L2
(b)	Describe the primary causes of Landslides and Earthquakes.	5M	CO4	L2
	(OR)			
9.	Discuss the Geothermal method in detail.	10M	CO4	L2
10(a)	Describe various geological considerations in the selection of a suitable site for a reservoir.	5M	CO2	L2
(b)	Explain the importance of stages of investigation in the selection of a dam site.	5M	CO2	L2
	(OR)			
11.	Discuss the importance of geological studies in tunnelling.	10M	CO3	L2

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23FE10-PROBABILITY & STATISTICS

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

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are the measures of central tendency?	2M	CO1	L1
(b)	Calculate the mean deviation about median from the data 6,7,10,12,13,4,12,16.	2M	CO1	L2
(c)	If the two regression lines are 2X + 3Y = 5 and 4X + Y = 7, find the mean values of X and Y.	2M	CO2	L2
(d)	If the correlation coefficient r=0.9 and the standard deviation of 'X' is 4 while that of 'Y'is 5, find the regression coefficient b_{yx}	2M	CO2	L2
(e)	If 'A' and 'B' are any two events with P(A) = 0.4, P(B) = 0.3 and P(A ∧ B) = 0.2 then find P(A/B).	2M	CO3	L2
(f)	If a Poisson-distributed variable 'X' has a mean of 4, what is the probability of exactly zero occurrences.	2M	CO3	L2
(g)	Compute the finite population correction factor when n = 50 and N = 500.	2M	CO4	L2
(h)	A sample of size 400 is taken from a population whose standard deviation is 16. Find the standard error of sample mean.	2M	CO4	L2
(i)	If n_1=8,n_2=10 and $\sum(x_i-\bar{x})^2=84.4, \sum(y_i-\bar{y})^2=102.6$ then find S^2.	2M	CO5	L2
(j)	Define Type I error and Type II error.	2M	CO5	L1

Q.No	All questions carry equal marks	Marks	CO	BL
2.	Calculate mean, median, mode of the following data	10M	CO1	L3

Marks	0-10	10-20	20-30	30-40	40-50	50-60
No. of Students	5	10	25	30	20	10

(OR)

3(a)	Discuss about types of variables.	5M	CO1	L2
(b)	The heights (in cm)of 8 students are recorded as: 150,155,160,165,170,175,180,185. Calculate the range, variance, and standard deviation of the heights.	5M	CO1	L3
4(a)	Calculate the Karl Pearson's coefficient of correlation of the following data.	5M	CO2	L3

X	12	9	8	10	11	13	7
Y	14	8	6	9	11	12	3

(b)	Fit a straight line from the following data by the method of least squares.	5M	CO2	L3

x	1	2	3	4	5
y	14	27	40	55	68

(OR)

5(a)	The regression equations of two variables X and Y are 7X +2Y=42 and 8X+3Y=54. Find (i)Mean values of X and Y (ii)Two regression coefficients (iii) Coefficient of correlation between X and Y.	5M	CO2	L3
(b)	By the method of least squares, fit a Second degree polynomial to the following data	5M	CO2	L3

x	1	2	3	4	5
y	10	12	8	10	14

6(a)	A businessman goes to hotels X, Y, Z, 20%, 50%, and 30% of the time respectively. It is known that 5%,4%,8% of the rooms in X,Y,Z hotels have faultyplumbing's. What is the probability that business man's room having faulty plumbing is assigned to hotel Z.	5M	CO3	L3
(b)	A random variable X has the following probability function $X=x$: 0, 1, 2, 3, 4, 5, 6, 7, 8 $P(X=x)$: a, $3a$, $5a$, $7a$, $9a$, $11a$, $13a$, $15a$, $17a$ Find *i*) *a ii*) Mean *iii*) Variance	5M	CO3	L3
	(OR)			
7(a)	Out of 800 families with 5 children each, how many families would you expect to have (i) exactly 3 boys (ii) 5 girls (iii) at least one boy.	5M	CO3	L3
(b)	For a normally distributed variate 'x' with mean 70 and standard deviation 16, then find the probabilities that (i) $38 \le x \le 46$ (ii) $82 \le x \le 94$	5M	CO3	L3
8.	A population consists of 5 numbers 4,8,12,16,20. Consider all possible samples of size two which can be drawn without replacement from this population. Find (*i*) mean of the population (*ii*) standard deviation of the population (*iii*) mean of the sampling distribution of means (*iv*) standard deviation of the sampling distribution of means.	10M	CO4	L3
	(OR)			
9(a)	A random sample of size 81 is taken from an infinite population having the mean 65 and the standard deviation10.What is the probability that $\bar{x}$ will be between 66 and 68.	5M	CO4	L3
(b)	The mean and the standard deviation of a sample are 11.795 and 14.054 respectively .If n=50, find 95% confidence interval for the mean.	5M	CO4	L3
10(a)	In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with standard deviations of 6.1 minutes. Can we reject the null hypothesis $\mu = 32.6$ minutes in favor of alternative null hypothesis $\mu > 32.6$ at $\alpha = 0.05$ level of significance.	5M	CO5	L4
(b)	The following figures show the distribution of digits in numbers chosen at random from a telephone directory Digits: 0, 1, 2, 3, 4, 5, 5, 7, 8, 9 Frequency: 1026, 1107, 997, 966, 1075, 933, 1107, 972, 964, 853 Test whether the digits may be taken to occur equally frequently in the directory.	5M	CO5	L4
	(OR)			
11(a)	Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level.	5M	CO5	L4
(b)	Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins shows the sample S.D. of their weights 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variances are equal at 5% level significance.	5M	CO5	L4

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

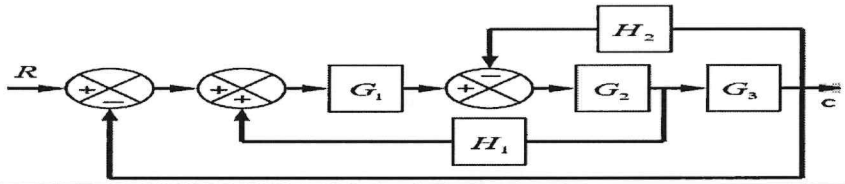
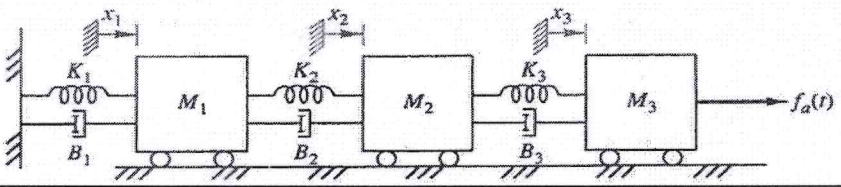
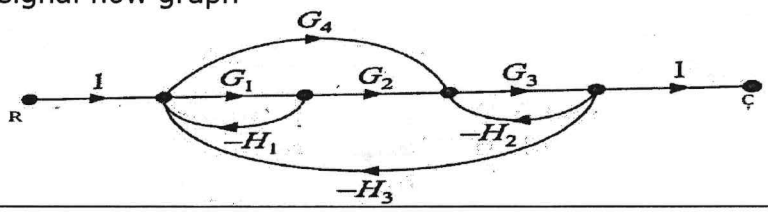
B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EE09-CONTROL SYSTEMS

(ECE & EEE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Write the real-time examples for open loop system.	2M	CO1	L2
(b)	The dynamic behavior of the system is described by $\frac{dc}{dt} + 10c = 10e$ Where 'e' is the input and 'c' is the output. Determine the transfer function.	2M	CO1	L2
(c)	Draw the response of the second order undamped system for a unit step input.	2M	CO2	L2
(d)	List the effects of PI controller on the system.	2M	CO2	L2
(e)	What is absolute stability and marginal stability?	2M	CO3	L1
(f)	Write the limitations of RH criterion.	2M	CO3	L2
(g)	Define Gain margin and Phase margin.	2M	CO4	L2
(h)	Draw the circuit of a lag compensator and its frequency response.	2M	CO4	L2
(i)	Draw the block diagram of state space representation.	2M	CO5	L2
(j)	Write the expression for the solution of non-homogeneous state equation.	2M	CO5	L1

Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	Discuss the effects of feedback on gain, sensitivity and stability.	5M	CO1	L2
(b)	Determine the transfer function of the following block diagram using reduction rules. 	5M	CO1	L3
	(OR)			
3(a)	Write the differential and Laplace equations for the following mechanical system 	5M	CO1	L3
(b)	Using Mason's gain formula, determine the transfer function of the following signal flow graph 	5M	CO1	L3
4(a)	The unity feedback is characterized by an open loop transfer function $G(s) = \frac{K}{s(s+4)}$ Determine the gain K so that the system will have the damping ratio of 0.3 for this value of K. Determine the peak overshoot for a unit step input.	5M	CO2	L3

(b)	Compute the damping factor, damping frequency, un-damped natural frequency, peak time and settling time for the unity feedback closed loop control system having open loop transfer function of $$G(s) = \frac{2}{s(s+10)}$$	5M	CO2	L3
	(OR)			
5(a)	Derive an expression for peak overshoot of the second order system whose response is given by $$c(t) = 1 - \frac{e^{-\zeta\omega_n t}}{\sqrt{1-\zeta^2}}\sin(\omega_d t + \theta)$$	5M	CO2	L3
(b)	For a unity feedback system whose open loop transfer function is given by, $$G(s) = \frac{20(s+2)}{s^2(s+1)(s+5)}$$ Determine i) Error coefficients ii) steady state error.	5M	CO2	L3
6(a)	Determine the number of roots on the imaginary axis for the characteristic equation $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24 = 0$	5M	CO3	L3
(b)	The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$. Determine the range of 'K for the stability of the closed loop system by applying RH criterion.	5M	CO3	L3
	(OR)			
7.	Sketch the root-locus for the unity feedback system with open-loop transfer function $$G(S) = \frac{K}{S(S+2)\ (S+4)}.$$	10M	CO3	L3
8.	Draw the Nyquist plot for the system whose open loop transfer function is $$G(s) = \frac{K}{s(s+2)(s+10)}$$ Determine the range of 'K' for which the closed loop system is stable.	10M	CO4	L3
	(OR)			
9.	Sketch the bode plot for the following transfer function and determine gain cross over frequency and phase cross over frequency $G(s) = \frac{5(1+2s)}{(1+4s)(1+0.25s)}$	10M	CO4	L3
10(a)	Obtain the transfer function for the system having state model $A=\begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix}$ $B=\begin{bmatrix} 3 \\ 5 \end{bmatrix}$ $C=[1\ \ 1]$ **D=[0]**	5M	CO5	L3
(b)	Develop the state space model in observable canonical form for the given system described by the differential equation $\dddot{Y} + 8\ddot{Y} + 10\dot{Y} + 4Y = U$	5M	CO5	L3
	(OR)			
11(a)	Find the homogeneous solution of the system given below: $$\dot{X} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} X;\ and\ X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$	5M	CO5	L3
(b)	Examine the controllability and observability of the system described by the state model $$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U \qquad Y = [1\ \ 0]\begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$	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. (IV Semester) ~~Regular~~/Supplementary Examinations

23AD02-ARTIFICIAL INTELLIGENCE

(AI&DS)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List the main characteristics of an intelligent agent.	2M	CO1	L2
(b)	Define a goal-based agent with an example.	2M	CO1	L2
(c)	What is the purpose of alpha-beta pruning in game search?	2M	CO2	L2
(d)	How does an evaluation function help in AI game playing?	2M	CO2	L2
(e)	What is Bayes' theorem, and why is it important in AI reasoning?	2M	CO3	L2
(f)	Describe Dempster-Shafer theory in reasoning under uncertainty.	2M	CO3	L2
(g)	What is the difference between First-Order Logic (FOL) and Propositional Logic?	2M	CO4	L2
(h)	Define **unification** in First-Order Logic with an example.	2M	CO4	L2
(i)	Name two typical expert systems and their applications.	2M	CO5	L2
(j)	What is the primary purpose of the MYCIN expert system?	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Compare and contrast Simple reflex and model-based agents in artificial intelligence.	5M	CO1	L3
(b)	Discuss the different approaches used for AI problem-solving.	5M	CO1	L2
	(OR)			
3(a)	Discuss how an AI system evaluates and improves its performance using feedback mechanisms.	5M	CO1	L2
(b)	Describe how artificial intelligence can be applied to real-world problem-solving scenarios.	5M	CO1	L2
4.	Compare and Contrast between uninformed and informed search strategies with examples.	10M	CO2	L3
	(OR)			
5(a)	Describe the working of the breadth-first search algorithm and its advantages and disadvantages.	5M	CO2	L3
(b)	Describe the depth-first search strategy along with its pros and cons.	5M	CO2	L2
6(a)	Discuss different types of knowledge representation techniques with examples.	5M	CO3	L2
(b)	Discuss the role of predicate logic in AI and its advantages over propositional logic.	5M	CO3	L3
	(OR)			
7(a)	What is logic programming? Discuss its applications in artificial intelligence.	5M	CO3	L2
(b)	Describe the knowledge representation using rules with an example.	5M	CO3	L3
8(a)	Describe the concept of the Reinforcement Learning.	5M	CO4	L2
(b)	Illustrate the different steps are involved to construct Resolution graph.	5M	CO4	L3
	(OR)			
9.	Demonstrate Unification Algorithm with an example.	10M	CO4	L3
10(a)	Discuss the architecture of expert systems and its key components.	5M	CO5	L2
(b)	Discuss the significance of knowledge Acquisition(KA) in expert systems.	5M	CO5	L2
	(OR)			
11(a)	Describe the MYCIN expert systems.	5M	CO5	L2
(b)	Discuss the concept of Expert System shells.	5M	CO5	L2

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

Revised 4/12/25

23AE04-MATERIALS AND MANUFACTURING TECHNOLOGY

(ASE)

Time : 3 hours

Max. Marks: 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Suggest two methods to control grain size during heat treatment.	2M	CO1	L2
(b)	What is the coordination number of BCC and FCC?	2M	CO1	L2
(c)	Draw and label the partial eutectic equilibrium diagrams.	2M	CO2	L2
(d)	Compare copper and aluminum in terms of their properties and structure.	2M	CO2	L2
(e)	What is shrinkage allowance?	2M	CO3	L2
(f)	Why is it essential to consider pattern allowances during pattern design?	2M	CO3	L2
(g)	Discuss the advantages of hydrostatic extrusion.	2M	CO4	L2
(h)	Compare AC and DC arc welding.	2M	CO4	L2
(i)	List out the types of drilling machines.	2M	CO5	L2
(j)	Explain the functions of cutting fluids.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Provide an example of an alloy system that follows the Hume-Rothery rules and forms a complete solid solution.	5M	CO1	L2
(b)	Differentiate between a substitutional solid solution, and an interstitial solid solution, with examples.	5M	CO1	L2
	(OR)			
3.	Calculate the atomic packing factor (APF) for a hexagonal close-packed (HCP) crystal structure.	10M	CO1	L4
4.	Analyze the Cu–Ni equilibrium phase diagram at various temperatures, and its importance in the formation and properties of Cu–Ni alloys.	10M	CO2	L3
	(OR)			
5(a)	Classify the steels based on the amount of carbon percentage with microstructure.	5M	CO2	L2
(b)	Draw a hypothetical phase diagram A-B with the help of the following data: (i) Melting point of A = 1100°C (ii) Melting point of B =800°C (iii) Eutectic reaction occurs at 500°C at 40% B composition (iv) Maximum solubility at 500°C of A in B and B in A at a eutectic temperature of 10% and 20% respectively, which drops down to 300°C at 10 atomic % in A, 5 atomic % in B. Label the phase diagram, Explain the structural changes of 25% B alloy when cooled from liquid state to room temperature.	5M	CO2	L4
6(a)	Illustrate the step-by-step process of die casting with a labelled diagram.	5M	CO3	L3
(b)	Describe the function of an open riser versus a blind riser.	5M	CO3	L2
	(OR)			
7(a)	Compare true centrifugal casting, semi-centrifugal casting, and centrifuge casting in terms of process, applications, and limitations.	5M	CO3	L2
(b)	Illustrate the principle of the gating system and its classifications.	5M	CO3	L2
8(a)	Design a setup for oxy-acetylene gas welding and explain its working with a diagram.	5M	CO4	L3
(b)	Compare the hot extrusion and the cold extrusion process.	5M	CO4	L2
	(OR)			
9(a)	Demonstrate your understanding of Smith forging by outlining the process of shaping a simple metal part.	5M	CO4	L2
(b)	Classify the rolling mills used in industry and explain where each type is most effectively applied in manufacturing.	5M	CO4	L2
10(a)	Analyze and compare the mechanisms of shaping and planning machines for tool movement and workpiece handling.	5M	CO5	L3
(b)	Summarize the concept of tool wear and describe the working of single-point and multipoint cutting tools with examples.	5M	CO5	L2
	(OR)			
11.	Illustrate the essential components of a lathe machine. Support your explanation with a clear and labelled diagram.	10M	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. (IV Semester) ~~Regular~~/Supplementary Examinations

23CS06-OPERATING SYSTEMS

(CSE & IT)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the role of an operating system in resource management?	2M	CO1	L1
(b)	Differentiate between a monolithic and microkernel structure.	2M	CO1	L2
(c)	What are the various states of a process?	2M	CO2	L1
(d)	Define a thread and how it is different from a process.	2M	CO2	L2
(e)	How does Peterson's Solution ensure mutual exclusion?	2M	CO3	L2
(f)	How does the hold and wait condition lead to deadlock?	2M	CO3	L2
(g)	What is internal fragmentation?	2M	CO4	L1
(h)	How does frame allocation impact system performance?	2M	CO4	L2
(i)	Differentiate between single-level and two-level directory structure.	2M	CO5	L2
(j)	What is free space management in a file system?	2M	CO5	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain the functions of an operating system with examples.	5M	CO1	L2
(b)	Discuss the evolution of operating systems and their impact on modern computing.	5M	CO1	L2
	(OR)			
3(a)	Describe different types of system calls with their functionality.	5M	CO1	L2
(b)	Explain about user mode and kernel mode with examples.	5M	CO1	L2
4(a)	Describe various operations that can be performed on a process with examples.	5M	CO2	L2
(b)	Compare the shared memory and message passing in IPC.	5M	CO2	L3
	(OR)			
5(a)	Explain Round Robin (RR) scheduling algorithm and its advantages in time-sharing systems.	5M	CO2	L2
(b)	Given that, Processes: {P1, P2, P3, P4}, Arrival Times: {0, 2, 4, 6}, Burst Times: {3, 6, 4, 5}, Time Quantum 2. Draw the Gantt chart and Calculate Completion Time (CT), Turnaround Time (TAT), and Waiting Time (WT) for each process using Round Robin Technique.	5M	CO2	L3
6(a)	Explain the concept of semaphores using wait() and signal() operations.	5M	CO3	L2
(b)	Discuss the Dining Philosophers Problem and solve it by using monitors.	5M	CO3	L3
	(OR)			
7(a)	Explain the Resource Allocation Graph (RAG) model for deadlock detection.	5M	CO3	L3
(b)	Explain the strategies for recovering from a deadlock.	5M	CO3	L2
8(a)	Discuss the structure of a page table.	5M	CO4	L2
(b)	Consider the available memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB. Apply the best, worst, first fit algorithm to place processes with the sizes of 212 KB,417 KB,112 KB,426 KB in order to explain which is the suitable algorithm with minimum fragmentation.	5M	CO4	L4
	(OR)			
9(a)	Given a reference string: (1,3,0,3,5,6,3,5,1,3,2,6,3) and 3 page frames. Simulate the FIFO page replacement algorithm and determine the total number of page faults.	5M	CO4	L3
(b)	Describe the structure of mass storage systems.	5M	CO4	L2
10(a)	Illustrate the tree-structured directory. Discuss their advantages and disadvantages.	5M	CO5	L2
(b)	Describe different file allocation methods.	5M	CO5	L2
	(OR)			
11(a)	Explain file sharing in a multi-user operating system.	5M	CO5	L2
(b)	How would you apply the concept of the access matrix and protection rings to design a secure access control system in an operating system.	5M	CO5	L3

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

4/12/25

23AM01-MACHINE LEARNING

(CSE(AI&ML))

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List the different types of data used in Machine Learning.	2M	CO1	L1
(b)	Distinguish between model selection and model evaluation.	2M	CO1	L2
(c)	Define briefly about NN with time complexity.	2M	CO2	L1
(d)	Compare similarity function and Non similarity function.	2M	CO2	L2
(e)	How is Bayesian Inference used in probabilistic classification?	2M	CO3	L2
(f)	Differentiate between Decision Tree classification and regression.	2M	CO3	L2
(g)	What is the role of the Sigmoid function in Logistic Regression?	2M	CO4	L1
(h)	Illustrate the role of the learning rate in Backpropagation.	2M	CO4	L3
(i)	Explain briefly about Fuzzy C-Means differ from K-Means.	2M	CO5	L2
(j)	How does matrix factorization help in clustering?	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain about data matching. How does it impact Machine Learning models?	5M	CO1	L2
(b)	Compare Learning by Rote, Learning by Induction, and Reinforcement Learning.	5M	CO1	L2
	(OR)			
3(a)	Describe the various stages involved in building a Machine Learning model, from data acquisition to evaluation.	5M	CO1	L2
(b)	What is a dataset? Explain the different types of datasets, their sources, and how they are used for training and testing in machine learning.	5M	CO1	L2
4.	Compare different Distance Measures used in KNN.	10M	CO2	L2
	(OR)			
5(a)	What are Proximity Measures in Nearest Neighbor models?	5M	CO2	L2
(b)	Discuss the advantages and disadvantages of the KNN classifier.	5M	CO2	L2
6(a)	State and explain Bayes' Theorem. How is it applied in classification problems?	5M	CO3	L3
(b)	Explain how Random Forests improve upon Decision Trees.	5M	CO3	L2
	(OR)			
7(a)	Compare Binary Classification vs. Multi-Class Classification using Bayes Classifier.	5M	CO3	L3
(b)	Explain the Gini Index with an example. How is it used for splitting nodes in a Decision Tree?	5M	CO3	L2
8(a)	What are the advantages of using MLPs over traditional Machine Learning models?	5M	CO4	L1
(b)	What are Linear Discriminants, and how are they used in classification?	5M	CO4	L2
	(OR)			
9.	What is the Support Vector Machine (SVM) algorithm? Explain with an example.	10M	CO4	L2
10(a)	What are the key challenges in Clustering? How can they be addressed?	5M	CO5	L2
(b)	Explain the role of Graph Theory in Spectral Clustering.	5M	CO5	L2
	(OR)			
11(a)	How does data partitioning affect the efficiency of clustering algorithms?	5M	CO5	L2
(b)	Discuss the applications of the EM Algorithm in real-world clustering problems.	5M	CO5	L3

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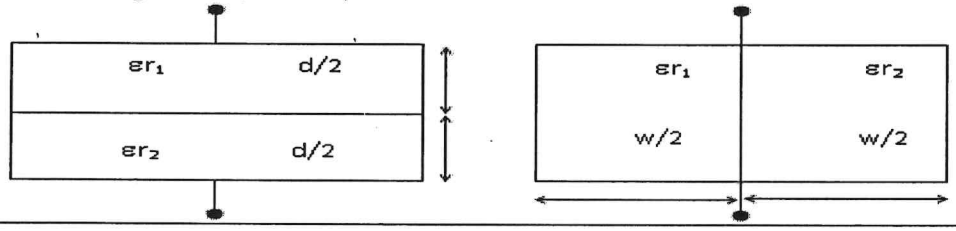
B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EC05-ELECTROMAGNETIC WAVES AND TRANSMISSION LINES

(ECE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	State Gauss's Law.	2M	CO1	L2
(b)	What is the unit of Electric Scalar Potential?	2M	CO1	L1
(c)	State Maxwell's Equations in differential form.	2M	CO1	L2
(d)	Explain the inconsistency of Ampere's Law.	2M	CO1	L2
(e)	Define the Poynting vector and explain its significance.	2M	CO2	L2
(f)	Define a uniform plane wave and explain its characteristics.	2M	CO2	L2
(g)	Define the primary constants of a transmission line.	2M	CO3	L1
(h)	How do you calculate the values of the series impedance and shunt admittance?	2M	CO3	L2
(i)	Explain the concept of stub matching and its significance.	2M	CO4	L2
(j)	Explain the characteristics of an open-circuited transmission line.	2M	CO4	L2

Q.No	All questions carry equal marks	Marks	CO	BL
2(a)	State Coulomb's Law and provide a detailed discussion on its underlying principles. Explain the procedure to apply Coulomb's Law for calculating the electric field intensity due to a point charge. Provide a clear and concise explanation, along with relevant equations and formulas.	5M	CO1	L3
(b)	Point charges 1mC and -2mC are located at (3, 2, -1) and (-1,-1, 4) respectively. (i) Calculate the electric force on a 10nC charge located at (0, 3, 1) (ii) Determine the electric field intensity at (0, 3, 1).	5M	CO1	L3
	(OR)			
3(a)	What is the Capacitance of a Capacitor? Discuss the Capacitance of Parallel Plate and Coaxial Cylindrical Capacitors.	5M	CO1	L3
(b)	Evaluate the capacitance of each of the capacitor shown by assuming $\varepsilon r_1=4$, $\varepsilon r_2=6$, d= 5mm and S= 30cm^2. 	5M	CO1	L3
4(a)	Define and Discuss the concepts of magnetic flux and magnetic flux density.	5M	CO1	L2
(b)	Evaluate the magnetic flux density B, given that the magnetic vector potential in the magnetic field region, A = - $\rho^2/4$ $\mathbf{a_z}$ Wb/m. Also calculate the total magnetic flux crossing the surface, $\phi = \pi/2$, $1 \le \rho \le 2$m, $0 \le z \le 5$m.	5M	CO1	L3
	(OR)			
5(a)	State and discuss differential and integral form of four Maxwell's equations used for time varying fields.	5M	CO1	L3
(b)	Apply Ampere's circuit law and obtain the magnetic field intensity H inside the toroid of radius ρ. Assume it has N number of turns and carries a current of 'I' Amps.	5M	CO1	L3

6(a)	Analyze the propagation characteristics of an electromagnetic wave through a lossy dielectric medium, considering the following parameters (i) Propagation constant, (ii) Attenuation constant, (iii) Phase constant, (iv) Intrinsic impedance, (v) Electric (E) and magnetic (H) field distributions, (vi) Loss tangent, (vii) Wave velocity, (viii) Wavelength. How do these parameters interact and affect the EM wave's behavior in the lossy dielectric medium?	5M	CO2	L3
(b)	Evaluate Electric Field Component E, Attenuation constant α, Skin Depth, when a wave is propagating through a lossy dielectric has an intrinsic impedance of $200\angle 30^0\ \Omega$ at a particular radian frequency ω. Given, $H = 10e^{-\alpha x}Cos\left(\omega t - \frac{1}{2}x\right)\boldsymbol{a}_y A/m.$	5M	CO2	L4
	(OR)			
7(a)	Describe the phenomenon of reflection and transmission of a plane electromagnetic wave at normal incidence on a Dielectric-Dielectric interface. In your discussion, include: (i) Incident wave characteristics (ii) Reflected wave characteristics (iii) Transmitted wave characteristics, (iv) Derivation of reflection coefficient (Γ) and transmission coefficient (τ) with mathematical expressions. Support your explanation with relevant diagrams and equations, highlighting the key parameters that influence the reflection and transmission processes at the interface.	5M	CO2	L3
(b)	Evaluate Phase constant, Loss Tangent, Intrinsic Impedance, Wave velocity, and H field, when a plane wave is propagating through a medium with $\varepsilon_r = 8$, $\mu_r = 2$. Given, $E = 0.5e^{-z/3}Sin(10^8 t - \beta z)\boldsymbol{a}_x V/m.$	5M	CO2	L4
8(a)	What are the secondary constants of a transmission line? Explain with suitable mathematical expressions.	5M	CO3	L3
(b)	Develop an expression for the propagation constant and characteristic impedance of a transmission line at high frequencies, R << ωL, G << ωC.	5M	CO3	L3
	(OR)			
9(a)	Define a lossless transmission line and explain its characteristics. Analyze the key parameters of a lossless transmission line, Propagation constant, Attenuation constant, Phase constant, Phase velocity, and Characteristic impedance of a line.	5M	CO3	L3
(b)	Calculate the line parameters R, L, G, and C for a lossy line with α = 0.25 Np/m, β = 4.2 rad/m, Z_0 = 100 - j5 Ω, f = 60 MHz.	5M	CO3	L3
10(a)	Analyze the parameters of a short-circuited transmission line, specifically (i) Voltage Reflection Coefficient (Γ) (ii) Voltage Standing Wave Ratio (VSWR), and (iii) Input Impedance (Zin).	5M	CO4	L3
(b)	Determine the voltage reflection coefficient and the voltage standing wave ratio of a transmission line with a characteristic impedance of 30 Ω, terminated with a complex load impedance of 40 + j20 Ω.	5M	CO4	L3
	(OR)			
11(a)	What is a quarter-wave transformer? Discuss its principle.	5M	CO4	L2
(b)	Determine the input impedance of a 30 m long lossless transmission line with a characteristic impedance of 50 Ω, operating at 2 MHz, and terminated with a load impedance of 60+ j40 Ω. Assume a phase velocity of 0.6c, where c is the speed of light.	5M	CO4	L3

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EE06-ANALOG CIRCUITS

(EEE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Write the Output of Combination Clipper.	2M	CO1	L2
(b)	How to draw a load Line?	2M	CO1	L2
(c)	Define the Gain of an Amplifier with Feedback.	2M	CO2	L1
(d)	Draw the hybrid circuit of Trans-Resistance Amplifier.	2M	CO2	L2
(e)	Draw the Circuit of RC Phase Shift Oscillator.	2M	CO3	L2
(f)	Draw the diagram of 741 Op-Amp.	2M	CO3	L2
(g)	Describe the output of Differentiator with circuit.	2M	CO3	L2
(h)	Write the Circuit of square Wave Form Generator.	2M	CO3	L2
(i)	Write the formula for Frequency of 555 in Astable mode.	2M	CO4	L1
(j)	List out the applications of PLL.	2M	CO4	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Describe negative clamping and the effect of Reference voltage.	5M	CO1	L2
(b)	Explain the fixed bias method & derive an expression for stability factor S.	5M	CO2	L2
	(OR)			
3(a)	With the help of a neat circuit diagram, explain the working of a two-level diode clipper.	5M	CO1	L2
(b)	Discuss the various types of bias compensation.	5M	CO1	L2
4.	Derive the expression for Voltage gain, Current gain, Input impedance and Output impedance of a CE Hybrid model.	10M	CO2	L3
	(OR)			
5(a)	Draw the h-parameter equivalent circuit of Common Base configuration.	5M	CO2	L 2
(b)	Explain in detail about voltage shunt feedback amplifier.	5M	CO2	L
6(a)	Differentiate the ideal and practical characterstics of an Op-Amp.	5M	CO3	L3
(b)	Summarise the working of an Oscillator with Block Diagram.	5M	CO3	L2
	(OR)			
7(a)	Discuss the principle of Wien Bridge Oscillator.	5M	CO3	L2
(b)	Describe the Op-Amp working with the block diagram.	5M	CO3	L2
8(a)	Explain the working of Square Wave Form Generator.	5M	CO3	L3
(b)	Explain the working of Sample and Hold circuit of an OP – AMP.	5M	CO3	L3
	(OR)			
9.	Describe the operation of Divider circuit using op-amp Circuits.	10M	CO3	L4
10(a)	Explain the working of 555 Timer in Monostable mode.	5M	CO4	L2
(b)	Explain the characteristics Resolution and Accuracy of an ADC.	5M	CO5	L2
	(OR)			
11(a)	With neat sketch explain the working principle of Weighted resistor DAC using Op-Amp.	5M	CO5	L2
(b)	Illustrate the Operation of V_{CO}.	5M	CO4	L2

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23AD03-INTRODUCTION TO DATA SCIENCE

(AI&DS)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define Data science and Bigdata. How Data science and Bigdata are related.	2M	CO1	L1
(b)	Compare Structural and Unstructural Data.	2M	CO1	L2
(c)	Define Machine Learning. List out applications of Machine Learning in data science.	2M	CO2	L1
(d)	List some python tools used in Machine Learning.	2M	CO2	L1
(e)	List different components of Hadoop.	2M	CO3	L1
(f)	Define Brewer's Theorem.	2M	CO3	L1
(g)	What is the need for using graph databases?	2M	CO4	L2
(h)	Explain about NLTK.	2M	CO4	L2
(i)	Identify different data visualization options available for visualizing data.	2M	CO5	L2
(j)	Explain about Crossfilter library.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	List and explain various data types used in Data science and Big data.	5M	CO1	L2
(b)	Identify various steps for preprocessing the data and explain them.	5M	CO1	L3
	(OR)			
3(a)	Discuss the various processing steps in Data Science.	5M	CO1	L2
(b)	Classify the term big data ecosystem.	5M	CO1	L2
4(a)	Design a case study on predicting malicious URLs.	5M	CO2	L3
(b)	How to design machine learning model? Explain various steps involved in it.	5M	CO2	L3
	(OR)			
5(a)	State and explain different types of Machine Learning with examples.	5M	CO2	L3
(b)	Identify various data structures helpful to handle large volumes of Data.	5M	CO2	L3
6(a)	Describe how Map-Reduce can be used to achieve parallelism in Hadoop Framework.	5M	CO3	L2
(b)	Discuss in detail about ACID properties of relational databases.	5M	CO3	L2
	(OR)			
7(a)	Illustrate the CAP theorem with a neat sketch.	5M	CO3	L2
(b)	Explain different types of NoSQL databases.	5M	CO3	L2
8(a)	Discuss about Neo4j architecture.	5M	CO4	L2
(b)	Explain how Cypher is used as a query language for exploring graph databases.	5M	CO4	L2
	(OR)			
9.	Design a case study focused on the classification of Reddit posts utilizing NLTK and SQLite.	10M	CO4	L3
10(a)	Discuss in detail how CrossFilter,MapReduce library helps in providing visualization of explored data.	5M	CO5	L2
(b)	Describe the procedure to create an interactive dashboard using dc.js.	5M	CO5	L2
	(OR)			
11(a)	Classify different dashboard development tools available for visualizing data.	5M	CO5	L2
(b)	Explain different ways of communicate the insights from the data analysis to end user.	5M	CO5	L2

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

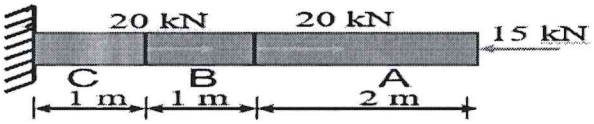
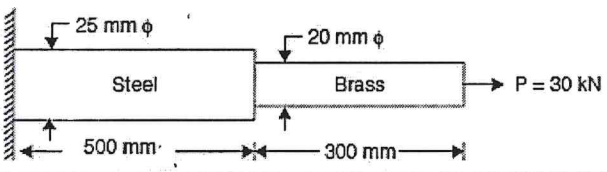
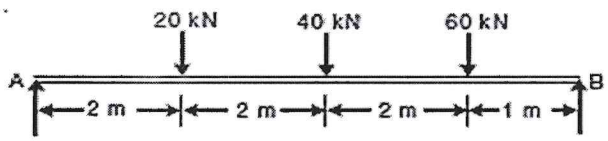
Bocool 5/12/25

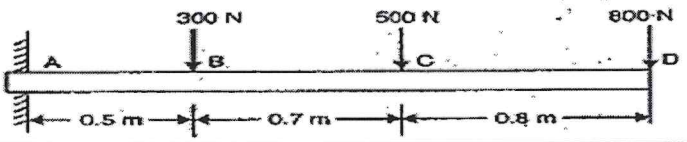
23AE05-SOLID MECHANICS

(ASE)

Time : 3 hours Max. Marks : 70

Q.No.	Compulsory Question	Marks	CO	BL
1(a)	Draw stress-strain diagram for ductile martial and mark stagnation points.	2M	CO1	L2
(b)	Differentiate between gradually applied and impact load.	2M	CO1	L2
(c)	Draw the statically determinate beam diagrams.	2M	CO2	L2
(d)	Distinguish between sagging and hogging bending moment.	2M	CO2	L2
(e)	What do you understand by neutral axis and moment of resistance?	2M	CO3	L1
(f)	Define torsional rigidity of a shaft? Explain.	2M	CO3	L2
(g)	Discuss the use of Mohr's circle method.	2M	CO4	L2
(h)	State the equations for normal stress on an inclined plane, in an element under general two-dimensional stress system.	2M	CO4	L2
(i)	What is the difference between double integration and Macaulay's method?	2M	CO5	L2
(j)	Define volumetric strain of thin cylinders.	2M	CO5	L2

Q.No.	All questions carry equal marks	Marks	CO	BL
2(a)	An axial pull of 20 KN is suddenly applied on a steel rod 2.5 m long and 1000 mm^2 in cross-section. Calculate the strain energy, which can be absorbed in the rod. Take E = 200 GPa.	5M	CO1	L3
(b)	A prismatic steel bar having cross sectional area of A=300 mm^2 is subjected to axial load as shown in figure. Find the net increase δL in the length of the bar. Assume E = 2 x 10^5MPa. 	5M	CO1	L3
	(OR)			
3(a)	A circular rod of 25 mm diameter and 500 mm long is subjected to a tensile force of 60 kN. Determine modulus of rigidity, bulk modulus and change in volume if Poisson's ratio = 0.3 and Young's modulus E = 2 × 10^5 N/mm^2.	5M	CO1	L3
(b)	The composite bar shown in Figure is subjected to a tensile force of 30 kN. The extension observed is 0.44. Find the Young's modulus of brass, if Young's modulus of steel is 2 × 10^5 N/mm^2. 	5M	CO1	L3
4.	Plot shear and bending-moment diagrams for a simply supported beam with a point loads, shown in figure. 	10M	CO2	L4
	(OR)			

5(a)	A cantilever beam of 2 m length carries the point load as shown in figure. Draw shear force and bending moment diagrams for the cantilever beam.  	5M	CO2	L3
(b)	Evaluate Shear force and Bending Moment of a Simply supported Beam of length 8 m carries point load of 45 KN at a distance 3 m from left end. also draw the Shear force diagram.	5M	CO2	L4
6(a)	A rectangular beam 60mm wide and 150 mm deep is simply supported over a span of 6 m. if the beam is subjected to central point load of 12 KN, find the maximum bending stress induced in the beam.	5M	CO3	L3
(b)	A circular steel pipe of external diameter 60 mm and thickness 8mm is used as a simply supported beam over an effective span of 2m. If permissible stress in steel is 150 N/mm^2, determine the maximum concentrated load that can be carried by it at mid span.	5M	CO3	L3
	(OR)			
7.	A shaft to transmit a torque of 30KN-m. The maximum shear stress is not to exceed 100MPa and the angle of twist is not to exceed 1°/m length. G= 80 GPa. Design the shaft according to the given specifications if it is a (i) Solid shaft (ii) Hollow shaft of internal diameter 90% of the external diameter.	10M	CO3	L4
8(a)	Prove that the maximum shear stress of a rectangular section is equal to 1.5 times of average shear stress.	5M	C04	L3
(b)	Draw variation of shear stresses across rectangle, triangle and I-sections.	5M	CO4	L2
	(OR)			
9.	Derive the expression for normal and tangential stresses on inclined plane subjected to biaxial like stresses along with the shear stress.	10M	C04	L3
10(a)	Derive the relation between slope, deflection and radius of curvature.	5M	CO5	L3
(b)	A cantilever beam 2 m long is subjected to a uniformly distributed load of 5 KN/m over its entire span. Evaluate the slope and deflection of cantilever beam at its free end. Take $EI=2.5x10^{12}kN- mm^2$.	5M	CO5	L4
	(OR)			
11(a)	A thin cylindrical shell of 500 mm diameter is to be designed for withstand an internal pressure of 4 MPa. Find the suitable thickness of the shell, if the allowable Hoop stress is 80 MPa and efficiency of the joint is 75%.	5M	CO5	L4
(b)	Derive stress induced in a Thin spherical shell subjected to an internal pressure P and find the stress induced in a 5 mm thick spherical gas vessel of 1.2 m diameter is subjected to an pressure of 1.8 MPa.	5M	CO5	L3

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B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23CS03-DATABASE MANAGEMENT SYSTEMS

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

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define database schema.	2M	CO1	L1
(b)	Write the purpose of Data dictionary.	2M	CO1	L2
(c)	Define Entity and Entity set.	2M	CO2	L1
(d)	What do you mean by referential integrity?	2M	CO2	L2
(e)	Give any two String functions in SQL.	2M	CO3	L3
(f)	Describe **GROUP BY** keyword in SQL.	2M	CO3	L2
(g)	What is Data redundancy?	2M	CO4	L1
(h)	Define Transitivity in functional dependency.	2M	CO4	L2
(i)	What is difference between Interleaved and Serial schedules?	2M	CO5	L1
(j)	Define Blind write operation.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Categorize and explain the different types of database users.	5M	CO1	L2
(b)	List any five significant differences between File-Processing systems and DBMS.	5M	CO1	L2
	(OR)			
3(a)	Differentiate Two-tier and Three-tier architecture of Database applications.	5M	CO1	L2
(b)	Describe any five features of Database Management system.	5M	CO1	L2
4(a)	Outline key constraints that can be given for Ternary relationship with example.	5M	CO2	L2
(b)	List out various operations in Relational algebra with example.	5M	CO2	L2
	(OR)			
5.	What are the two ways in which class hierarchy can be viewed? What is aggregation? Give an example scenario motivating the use of each of these ER model design constructs.	10M	CO2	L2
6.	What are the Domain constraints that can be implemented using the query language? Explain each with suitable example.	10M	CO3	L3
	(OR)			
7(a)	Demonstrate UNION, INTERSECT and EXCEPT operations in SQL.	5M	CO3	L3
(b)	Define join. Write examples on different joins in SQL.	5M	CO3	L3
8(a)	Explain the rules that you can infer or compute the Closure of a given set F of FDs.	5M	CO4	L2
(b)	What is prime and non-prime attribute? Give the rules for Second Normal Form with suitable examples.	5M	CO4	L2
	(OR)			
9(a)	Demonstrate the rules in BCNF with suitable example.	5M	CO4	L3
(b)	Compute the closure of the following set F of functional dependencies for relation schema R=(A,B,C,D,E) A→BC, CD→E, B→D, E→A List the candidate keys for R.	5M	CO4	L3
10(a)	Define serializability. Explain Conflict Serializability in schedules.	5M	CO5	L2
(b)	When a detection algorithm determines that a deadlock exists, what are the common solutions to rollback transactions to break the deadlock?	5M	CO5	L2
	(OR)			
11(a)	Demonstrate different deadlock prevention schemes using timestamps.	5M	CO5	L2
(b)	Explain various approaches in Log-based Recovery.	5M	CO5	L2

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R23

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EC06-ELECTRONIC CIRCUIT ANALYSIS

(ECE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	State the Miller's theorem.	2M	CO1	L2
(b)	Define Gain bandwidth product.	2M	CO1	L2
(c)	Calculate the quality factor of an inductor L=10 μH and internal resistance of R=10ohms at 100MHz.	2M	CO1	L2
(d)	Differentiate the cas code and Darlington pair circuit.	2M	CO1	L2
(e)	State Positive feedback and give its gain with feedback.	2M	CO1	L2
(f)	In Hartley oscillator, two inductors $L_1 = L_2$ = 2mH and C = 5 pF find the frequency of oscillation.	2M	CO1	L2
(g)	State the conditions to be satisfied for sustained oscillations.	2M	CO1	L2
(h)	Draw the circuit diagram of Wien bridge oscillator using BJT.	2M	CO1	L2
(i)	What are the advantages of complimentary push-pull amplifier?	2M	CO1	L2
(j)	Discuss the thermal stability in power amplifier.	2M	CO1	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Derive the expressions for hybrid-pi parameters of CE transistor at high frequencies.	5M	CO4	L3
(b)	A transistor is operating at I_C of 5mA at room temperature. It has h_{fe}= 100, h_{ie}=1000Ω h_{re}=2.5x10^{-4} , h_{oe}=50 μʊ. f_T=4 MHz, CC=2pF and Ce=18 pF. Find $r_{b'e}$, $r_{bb'}$, g_m and f_H for R_L=1 KΩ.	5M	CO4	L3
	(OR)			
3.	Derive the expression for CE amplifier current gain with and without resistive load.	10M	CO4	L3
4.	Analyze the frequency response by deriving the expressions for cascaded amplifier and how much variation is occurred in bandwidth for n= 2. Analyze the frequency response of two stage amplifier having lower and upper cutoff frequencies of each stage 100 Hz and 30 MHz.	10M	CO4.	L3
	(OR)			
5(a)	Analyze the expressions of input resistance and current gain of BJT Darlington amplifier.	5M	CO4	L3
(b)	Analyze the necessity of bootstrap emitter follower circuit and justify its characteristics.	5M	CO4	L3
6(a)	Illustrate the effect of negative feedback on amplifier characteristics.	5M	CO1	L2
(b)	Give the inference if an amplifier has a midband gain of 125 and a bandwidth of 250KHz and 10% of negative feedback is introduced, evaluate the new bandwidth and gain.	5M	CO2	L4
	(OR)			
7(a)	What are the different types of feedback amplifiers? Illustrate with neat block diagrams.	5M	CO1	L2
(b)	A current-series negative feedback amplifier has a voltage gain without feedback A=300, input resistance R_i=2kΩ, output resistance R_o=10kΩ and feedback ratio β=0.01. Calculate the voltage gain with feedback A_f, input resistance R_{if} and output resistance R_{of} of the amplifier with feedback.	5M	CO2	L4
8(a)	Illustrate the types of oscillators and give its applications in each.	5M	CO3	L3
(b)	Derive an expression for frequency of oscillations of a generalized LC oscillator.	5M	CO3	L3
	(OR)			
9.	In a transistorized colpitts oscillator the two capacitances are 10 pF and 20 pF while the frequency is to be changed from 2 MHZ to 10 MHZ. Design the range over which the inductor is to be varied by exploring principle of working along with neat circuit diagram.	10M	CO3	L4
10(a)	How to achieve maximum efficiency using a class A transformer coupled amplifier by deriving the expression justify its conversion?	5M	CO2	L4
(b)	Illustrate crossover distortion suggest how it can be eliminated exploring with the principle of operation of required power amplifier with a neat sketch.	5M	CO2	L4
	(OR)			
11(a)	Illustrate the frequency response of staggered tuned amplifier.	5M	CO1	L2
(b)	Analyze the differences between class C single tuned and Double tuned amplifiers.	5M	CO2	L4

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EE07-POWER SYSTEMS-I

(EEE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What are the types of power plants?	2M	CO1	L2
(b)	What is the function of condenser in thermal Power Plant?	2M	CO1	L2
(c)	Define nuclear fission and fusion.	2M	CO2	L2
(d)	List three disadvantages of solar energy.	2M	CO2	L2
(e)	What are the substation equipment showing in the substation layout?	2M	CO3	L3
(f)	Write Advantages of Gas insulated substation.	2M	CO3	L3
(g)	What are the types of super tension cable?	2M	CO4	L3
(h)	List out the various parts of cables.	2M	CO4	L3
(i)	Write Objectives of tariff.	2M	CO5	L4
(j)	Define is Base Load.	2M	CO5	L4
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Compare Fire tube and Water tube boilers used in Thermal Power Plants.	5M	CO1	L2
(b)	Draw a neat schematic dia.	5M	CO1	L2
	(OR)			
3(a)	Draw the schematic diagram of a modern steam power station and explain its operation.	5M	CO1	L2
(b)	What factors are taken into account while selecting the site for a steam power station?	5M	CO1	L2
4.	How the wind energy is converted into electrical energy? Explain in detail.	10M	CO2	L2
	(OR)			
5(a)	State the advantages and disadvantages of nuclear power plant.	5M	CO2	L2
(b)	Explain principle and operation of Nuclear Reactor with relevant diagram.	5M	CO2	L2
6(a)	Interpret the main features of Gas Insulated Substations.	5M	CO3	L3
(b)	Explain the parts and equipment's of Air Insulated Substations.	5M	CO3	L3
	(OR)			
7(a)	What are the essential parts of GIS?	5M	CO3	L3
(b)	Write the Advantages and Disadvantages of GIS.	5M	CO3	L3
8(a)	Explain Belted Cable with neat sketch.	5M	CO4	L3
(b)	Describe briefly how will you solve a.c. distribution problems.	5M	CO4	L3
	(OR)			
9.	A single phase distributor 2 kilometres long supplies a load of 120 A at 0·8 p.f. lagging at its far end and a load of 80 A at 0·9 p.f. lagging at its mid-point. Both power factors are referred to the voltage at the far end. The resistance and reactance per km (go and return) are 0·05 Ω and 0·1 Ω respectively. If the voltage at the far end is maintained at 230 V, calculate: (i) voltage at the sending end (ii) phase angle between voltages at the two ends.	10M	CO4	L3
10(a)	Define and explain the importance of the following terms in generation: (*i*) connected load (*ii*) maximum demand (*iii*) demand factor (*iv*) average load.	5M	CO5	L4
(b)	A power station has to meet the following demand : Group A : 200 kW between 8 A.M. and 6 P.M. Group B : 100 kW between 6 A.M. and 10 A.M. Group C : 50 kW between 6 A.M. and 10 A.M. Group D : 100 kW between 10 A.M. and 6 P.M. and then between 6 P.M. and 6 A.M. Plot the daily load curve and determine (i) diversity factor (ii) units generated per day (iii) load factor.	5M	CO5	L4
	(OR)			
11(a)	Describe the desirable characteristics of tariff.	5M	CO5	L4
(b)	Discuss some of the important types of tariff commonly used.	5M	CO5	L4

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23ME07-FLUID MECHANICS & HYDRAULIC MACHINES

(ME)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define the term "surface tension".	2M	CO1	L1
(b)	What is meant by meta Centre?	2M	CO1	L1
(c)	Define rotational flow.	2M	CO2	L1
(d)	List any two minor losses in pipes.	2M	CO2	L1
(e)	Define stream line body.	2M	CO3	L1
(f)	What is the dimensional formula for power?	2M	CO3	L1
(g)	Express the formula for the force exerted by a jet of water on a fixed inclined plate in the direction of the jet.	2M	CO4	L1
(h)	Define jet ratio for Pelton turbine.	2M	CO4	L1
(i)	Define the term "manometric efficiency".	2M	CO5	L1
(j)	List any two components of a reciprocating pump.	2M	CO5	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Formulate an expression for the capillary Rise.	5M	CO1	L3
(b)	Estimate the surface tension in a soap bubble of 40mm diameter when the inside pressure is 2.5 N/m^2 above atmospheric pressure.	5M	CO1	L3
	(OR)			
3(a)	Explicate the conditions of equilibrium for floating bodies.	5M	CO1	L2
(b)	A block of wood of specific gravity 0.7 floats in water. Find meta Centre height of block of size 2m*1m*0.8m.	5M	CO1	L3
4(a)	Distinguish Stream function and velocity potential function.	5M	CO2	L2
(b)	Enumerate the assumptions of Bernoulli's equation.	5M	CO2	L1
	(OR)			
5	Deduce an expression for the loss of head due to sudden enlargement of a pipe.	10M	CO2	L3
6(a)	Illustrate the effect of pressure gradient on boundary layer separation.	5M	CO3	L2
(b)	Estimate the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $(u/U) = (y/\delta)$ where u is the velocity at a distance y from the plate and u=U at y=δ, where δ boundary layer thickness.	5M	CO3	L3
	(OR)			
7	The pressure difference 'ΔP' in a pipe of diameter 'D' and length 'L' due to viscous flow depends on the velocity 'V' , viscosity 'μ' and density 'ρ' using Buckingham's π-theorem obtain expression for ΔP.	10M	CO3	L3
8(a)	Formulate an expression for the force exerted by a jet of water on a fixed curved plate in the direction of the jet, when jet strikes curved plate at one end tangentially.	5M	CO4	L3
(b)	A jet of water of diameter 7.5cm strikes a curved plate at its centre with a velocity of 20m/s. the curved plate is moving with a velocity of 8m/s in the direction of the jet. The jet is deflected through an angle of 165^0. Assuming the plate smooth find: (i) force exerted on the plate in the direction of jet (ii) power of the jet and (iii) efficiency of the jet.	5M	CO4	L3
	(OR)			
9(a)	Illustrate the Francis turbine.	5M	CO4	L2
(b)	A Pelton wheel has a mean bucket speed of 10 meters per second with a jet of water flowing at the rate of 700 litres/s under a head of 30 meters. The buckets deflect the jet through an angle of 160^0. Estimate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficiency of velocity as 0.98.	5M	CO4	L3
10(a)	Formulate an expression for the unit discharge of hydraulic turbine.	5M	CO5	L3
(b)	A turbine develops 7225KW power under a head of 25 meters at 135 rpm. Evaluate the specific speed of the turbine and state the type of the turbine.	5M	CO5	L3
	(OR)			
11(a)	Deduce an expression for the specific speed of centrifugal pump.	5M	CO5	L3
(b)	The internal and external diameters of the impeller of a centrifugal pump are 200mm and 400mm respectively. The pump is running at 1200rpm. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Find the work done by the impeller per unit weight of water.	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. (IV Semester) ~~Regular~~/Supplementary Examinations

23IT01-DIGITAL LOGIC & COMPUTER ORGANIZATION

(AI&DS and CSE(AI&ML))

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is gray code? binary code 1111 converts into gray code.	2M	CO1	L2
(b)	Draw the logical circuit for F=AB+A'B'+A'B.	2M	CO1	L2
(c)	What is Excess-3 code for 27?	2M	CO2	L2
(d)	What is program counter?	2M	CO2	L2
(e)	What is von neumann cycle ?	2M	CO3	L2
(f)	What is IEEE representation of floating-point number?	2M	CO3	L2
(g)	What is volatile and non-volatile memory ?	2M	CO4	L2
(h)	Describe terms i. cache hit ii. cache miss.	2M	CO4	L2
(i)	What is hardware interrupt?	2M	CO5	L2
(j)	Expain about USB interface.	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain the difference between weighted and non-weighted binary codes with examples.	5M	CO1	L2
(b)	Convert the following hexadecimal numbers to binary, octal, and decimal formats. (i) $(88BAE)_{16}$.	5M	CO1	L3
	(OR)			
3(a)	Simplify the following Boolean function F, together with the don't-care conditions d and then express the simplified function in sum-of-min terms form. F(x,y,z)= Σ0, 1, 4, 5, 6) d(x,y,z)=Σ(2, 3, 7).	5M	CO1	L3
(b)	Let us minimize the boolean expression using k-map Y = ABC'D + ABC'D' + ABCD + A'BCD + ABCD' + A'BCD'.	5M	CO1	L3
4.	Design the 4-bit Asynchronous up counter with timing diagram, logic diagram and truth table.	10M	CO2	L3
	(OR)			
5(a)	Design a full adder with truth table and logic gates.	5M	CO2	L2
(b)	Describe the basic functional units of a computer and their roles.	5M	CO2	L2
6(a)	Discuss the design and operation of ripple carry adder.	5M	CO3	L2
(b)	Discuss an Algorithm for Multiply two floating point numbers with example.	5M	CO3	L2
	(OR)			
7(a)	Explain the Role of Instruction Execution Registers in Processor.	5M	CO3	L2
(b)	Explain in detail multiple bus organization with the help of a diagram.	5M	CO3	L2
8(a)	Discuss about the concept of cache memory.	5M	CO4	L2
(b)	Classify different memories and explain.	5M	CO4	L2
	(OR)			
9.	Describe the organization of virtual memory, including the concepts of page tables and segmentation.	10M	CO4	L2
10(a)	Illustrate programmed I/O with an example.	5M	CO5	L2
(b)	Explain the concept of buffering in I/O operations?	5M	CO5	L2
	(OR)			
11(a)	Explain how interrupts are handled from multiple devices.	5M	CO5	L2
(b)	Briefly Explain in detail the DMA Controller.	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. (IV Semester) ~~Regular~~/Supplementary Examinations

6/12/25

23AE06-AERODYNAMICS

(ASE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	A source of strength 5 m^2/s is superimposed on a uniform flow of velocity 2 m/s. Determine the location of the stagnation point.	2M	CO1	L1
(b)	What is the value of stream function of streamline passing thorough resulting flow field superposition of uniform flow and doublet_____	2M	CO1	L1
(c)	What is the chord length for symmetric airfoil while it is being transformed from circle of radius 'a' using Kutta-Joukowski transformation function?	2M	CO2	L2
(d)	What is the required eccentricity for circle in the physical plane to transform into 20% of symmetrical airfoil?	2M	CO2	L2
(e)	What does the first digit in NACA 2412 airfoil represent?	2M	CO3	L2
(f)	What is the location of aerodynamics center for cambered airfoil by the theoretical result?	2M	CO3	L2
(g)	What is meant by induced drag?	2M	CO4	L2
(h)	Calculate lift coefficient for a thin symmetrical airfoil at 5 deg. angle of attack.	2M	CO4	L2
(i)	What is meant by streamlined body?	2M	CO5	L2
(j)	What is meant by bluff body?	2M	CO5	L2
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Draw the streamlines for the combination of (i) uniform flow with source (ii) uniform flow with source and sink (iii) source and sink (limiting condition).	5M	CO1	L2
(b)	Derive the equation of streamlines of doublet flow.	5M	CO1	L3
	(OR)			
3(a)	Prove that the superposition of a uniform flow and source-sink is a flow over Rankine oval.	5M	CO1	L3
(b)	A source and sink of the strength 25 m^2/s are situated at a distance of 2 m. A uniform flow of 8 m/s parallel to the line joining the source and sink is superimposed on the pair. Find the length of the Rankine oval formed and the distance of the stagnation points from the source.	5M	CO1	L3
4(a)	Transform a point p(x, iy) in the physical plane to ζ-plane (transformed plane), with the transformation function $\zeta = 1/z$.	5M	CO2	L3
(b)	Show that the shape of the trailing edge of Joukowski airfoil is cusped.	5M	CO2	L3
	(OR)			
5.	A symmetrical aerofoil is obtained by transforming a circle of radius 'a' with Kutta-Joukowski transformation function? The center of the circle in the physical plane is shifted from the origin 'o' and located downstream of the origin on the x- axis. Let 'e' be the eccentricity and actual distance of the center of circle from the origin is 'be'. The parameter 'b' is a constant in Kutta-Joukowski transformation function. Treat the radius of circle a = b+be. Find out the coordinates of symmetrical airfoil profile in the transformed plane.	10M	CO2	L3

6(a)	Describe straight vortex filament and vortex sheet.	5M	CO3	L2
(b)	Enlist the Statements of Kutta condition.	5M	CO3	L2
	(OR)			
7.	Derive the fundamental equation of thin aerofoil theory	10M	CO3	L3
8(a)	Derive the expression for downwash distribution over Single horseshoes vortex.	5M	CO4	L3
(b)	Illustrate (i) Trailing vortices (ii) Horse shoe vortex (iii) Bound vortex.	5M	CO4	L2
	(OR)			
9.	Derive the fundamental equation of Prandtl's lifting-line theory.	10M	CO4	L3
10(a)	A flat plate of length 0.8 m and width 1.9 m is kept in a sea level air stream flowing at a velocity of 5.3 m/s. Assuming a linear velocity profile for the boundary layer over the plate. Evaluate the boundary layer thickness at the end of the plate	5M	CO5	L3
(b)	Given that the velocity distribution in a laminar boundary layer due to flow over flat plate is given by the following expression. Where u is the velocity at y and u→U(freestream velocity) as y→δ. Calculate the displacement thickness. $\frac{u}{U}=\left(\frac{3}{2}\left(\frac{y}{\delta}\right)-\frac{1}{2}\left(\frac{y}{\delta}\right)^3\right)$	5M	CO5	L3
	(OR)			
11(a)	Air moves over a flat plate with a uniform freestream velocity of 10m/s. At a position 15 cm away from the leading edge of the plate, what is the displacement thickness? Use the parabolic velocity profile in the boundary layer $u/U = 2(y/\delta)-(y/\delta)^2$, where 'u' is the velocity at y and u→U (freestream velocity) as y→δ (boundary layer thickness). For air kinematic viscosity is 1.5 X 10^{-5} m^2/s and density is 1.23kg/m^3.	5M	CO5	L3
(b)	Derive the expression for displacement thickness for boundary layer flow.	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. (IV Semester) ~~Regular~~/Supplementary Examinations

Bcccef 6/12/25

23CE07-HYDRAULICS & HYDRAULIC MACHINERY

(CE)

Time : 3 hours

Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define the Reynolds number.	2M	CO1	L1
(b)	List out the experimental methods to determining the co-efficient of viscosity.	2M	CO1	L1
(c)	Differentiate prismatic and non-prismatic channels.	2M	CO2	L2
(d)	List out the Most Economical Trapezoidal Channel.	2M	CO2	L1
(e)	Give the formula for total energy and specific energy.	2M	CO2	L1
(f)	A hydraulic jump forms at the downstream end of spillway. If the depth before jump is 2 m and the depth after the jump 6 m. Find the energy loss.	2M	CO3	L1
(g)	Define the turbine and classify the turbines based on the type of energy at inlet.	2M	CO4	L1
(h)	Find the force exerted by a jet of water of diameter 35 mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 15 m/s.	2M	CO5	L1
(i)	Define a centrifugal pump.	2M	CO4	L1
(j)	What is the function of air vessel?	2M	CO4	L1

Q.No	All questions carry equal marks	Marks	CO	BL
2.	Prove that the velocity distribution for viscous flow between two parallel plates when both plates are fixed across a section is parabolic in nature.	10M	CO1	L3
	(OR)			
3(a)	An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and of length 300 m. The rate of flow of fluid through the pipe is 3.5 litres/s. Determine the pressure drop in a length of 300 m and also shear stress at the pipe wall.	5M	CO1	L3
(b)	Define the following terms (i) laminar boundary layer (ii) turbulent boundary layer (iii) laminar sub layer.	5M	CO1	L1
4(a)	Give a complete classification of the different types of open channel flow and each type of flow.	5M	CO2	L2
(b)	A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slope of the bed is 1 in 1500. The area of the section is 40m^2. Determine the dimensions of the section if it is most economical. Determine the discharge of the most economical section if C = 50.	5M	CO3	L3
	(OR)			
5(a)	Derive the condition for most economical triangular channel section.	5M	CO2	L3
(b)	A rectangular channel of width, 4 m is having a bed slope of 1 in 1500. Determine the maximum discharge through the channel. Take value of C = 50.	5M	CO3	L3
6(a)	Derive the expression for critical depth and critical velocity.	5M	CO2	L3

(b)	The depth of flow of water, at a certain section of a rectangular channel of 4 m wide, is 0.5 m. This discharge through the channel is 16 m^3/s. If a hydraulic jump takes place on the downstream side, Determine the depth of flow after the jump.	5M	CO3	L3
	(OR)			
7(a)	State the assumptions made in the derivation of dynamic equation for gradually varied flow.	5M	CO2	L1
(b)	The discharge of water through a rectangular channel of width 6m, is $18m^3/s$ when depth of flow of water is 2m. Calculate: (i) specific energy of the water, (ii) critical depth and critical velocity and (iii) value of minimum specific energy.	5M	CO3	L3
8(a)	Derive an expression for the force exerted by a jet of water on a fixed inclined vertical plate in the direction of the jet.	5M	CO4	L3
(b)	Describe briefly the function of various main components of Pelton turbine with neat sketches.	5M	CO4	L2
	(OR)			
9.	A Francis is turbine with an overall efficiency of 75 present is required to produce 149.26 kw it is working under a head of 7.62m the peripheral velocity $=0.26\sqrt{2gH}$ and the radial velocity of flow at inlet is $0.96\sqrt{2gH}$ the wheel runs at 150 r.p.m and the Hydraulic losses in the turbine are 22 present of the available energy .Assuming radial discharge determine: (i) The guide blade angle (ii) The wheel vane angle at inlet (iii) Diameter of the wheel at inlet and (iv) Width of the wheel at inlet.	10M	CO5	L3
10(a)	List out the different efficiencies of a centrifugal pump and define it.	5M	CO4	L1
(b)	The internal and external diameters of the impeller of a centrifugal pump are 300 mm and 600 mm respectively. The pump is running at 1000 r.p.m. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.	5M	CO5	L3
	(OR)			
11(a)	Derive the expression for the specific speed of a centrifugal pump.	5M	CO4	L3
(b)	A 3-stage centrifugal pump has impellers 40 cm in diameter and 2cm wide at outlet. The vanes are curved back at the outlet @ 45^0 and reduce the circumferential area by 10 %. The manometric efficiency is 90% and overall efficiency 90%. Determine the head generated by the pump when running @1000rpm delivering 50liters per second. What should be the shaft horse power?	5M	CO5	L3

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R23

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING(AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23IT02-SOFTWARE ENGINEERING

(CSE & IT)

Time : 3 hours Max. Marks :70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define Spiral model.	2M	CO1	L1
(b)	What is SDLC? List the phases of SDLC.	2M	CO1	L1
(c)	Define the Requirement? Mention the types of the Requirements.	2M	CO1	L1
(d)	Define Non-Functional Requirements.	2M	CO1	L1
(e)	What is a Data Flow Diagram (DFD)?	2M	CO1	L1
(f)	What is coupling in software design?	2M	CO1	L1
(g)	List the five levels of the SEI Capability Maturity Model (CMM).	2M	CO1	L1
(h)	Define white-box testing.	2M	CO1	L1
(i)	What is adaptive maintenance?	2M	CO1	L1
(j)	What are two key characteristics of CASE tools?	2M	CO1	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	What is meant by software Engineering? Write the characteristics of good software.	5M	CO1	L1
(b)	Describe the Waterfall model and its phases.	5M	CO2	L2
	(OR)			
3(a)	Explain the key stages in the evolution of software engineering.	5M	CO1	L2
(b)	How does computer system engineering relate to software engineering?	5M	CO1	L3
4.	Develop an SRS document outline for an online shopping system.	10M	CO1	L3
	(OR)			
5(a)	How does the COCOMO model help in software cost estimation?	5M	CO1	L3
(b)	Compare Functional and Non-Functional Requirements.	5M	CO1	L2
6(a)	What are the main characteristics of a good software design?	5M	CO1	L1
(b)	Explain the concept of design patterns and their importance.	5M	CO1	L2
	(OR)			
7(a)	What are the key components of Structured Analysis?	5M	CO1	L1
(b)	How does structured analysis improve the overall software development process?	5M	CO1	L2
8(a)	What is black-box testing? Explain its advantages and disadvantages.	5M	CO1	L1
(b)	What are some general issues faced during software testing?	5M	CO1	L1
	(OR)			
9.	Explain the importance of software debugging with examples of common bugs and how to fix them.	10M	CO1	L2
10(a)	What are the different process models used in software maintenance?	5M	CO1	L1
(b)	Explain how software aging affects maintenance.	5M	CO1	L2
	(OR)			
11(a)	What are the benefits of reusing software components?	5M	CO1	L1
(b)	What are the challenges in implementing reuse at the organization level?	5M	CO1	L1

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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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

B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

23EC07-ANALOG COMMUNICATIONS

(ECE)

Time : 3 hours | Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	Define modulation index in Amplitude modulation (AM).	2M	CO1	L2
(b)	What is net modulation index in AM, for a message signal sinusoidal modulating a carrier with modulation indices 0.1, 03 and 0.4?	2M	CO1	L2
(c)	Define quadrature null effect.	2M	CO1	L2
(d)	Draw the block diagram of frequency division multiplexing (FDM).	2M	CO1	L1
(e)	What is the bandwidth of frequency modulated (FM) signal $s(t) = 5\cos(2\pi 10^6 t + 10\sin 4000\pi t)$?	2M	CO2	L2
(f)	State the difference between narrow band frequency modulation and wide band frequency modulation.	2M	CO2	L2
(g)	Draw the block diagram of FM receiver.	2M	CO3	L1
(h)	Define image frequency rejection ratio.	2M	CO3	L2
(i)	Define signal to noise ratio (SNR).	2M	CO4	L2
(j)	Mention the types of analog pulse modulation techniques.	2M	CO4	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Explain the demodulation of an AM signal using square law demodulator.	5M	CO1	L3
(b)	An amplitude modulated (AM)signal is given as $s(t)=5\cos 2\pi x10^6 t\ (1+\cos 2\pi x10^6 t)$. Estimate the (i) Message signal and Carrier signal frequencies (ii)Total power (iii) Bandwidth.	5M	CO1	L2
	(OR)			
3(a)	Obtain the expression for total power for a single tone AM signal.	5M	CO1	L2
(b)	Obtain the (i)Total Power (ii) Bandwidth (iii) Transmission efficiency of an AM signal given as $s(t) = 5\cos 4\pi 10^6 t(1+3\cos 4000\pi t)$.	5M	CO1	L3
4(a)	Discuss about the generation of single side band suppressed carrier Amplitude modulated (SSBSC-AM) Signal using phase discrimination method.	5M	CO1	L2
(b)	Find the percentage of power saving in (i) Double side band suppressed carrier Amplitude modulated Signal. (ii) Single side band suppressed carrier Amplitude modulated Signal for an AM signal having modulation index of 0.5.	5M	CO1	L3
	(OR)			
5(a)	Summarize the process of coherent detection of double side band suppressed carrier Amplitude modulated (DSBSC-AM) Signal.	5M	CO1	L2
(b)	Discuss about the effect of phase error in the demodulation of single sideband suppressed carrier amplitude modulation using coherent detection.	5M	CO1	L2
6(a)	Discuss about single tone frequency modulation with relevant mathematical expressions.	5M	CO2	L2
(b)	Obtain the expression for an FM signal with $c(t)=4\cos(2\pi x10^6 t)$ and $m(t)= 8\cos(2\pi x10^3 t)$. Determine the power and bandwidth of the FM signal when the frequency sensitivity is 10KHz/Volt	5M	CO2	L3
	(OR)			
7.	Examine the demodulation of FM signal phase locked loop using phase locked loop (PLL).	10M	CO2	L3
8(a)	Explain AM high level transmitter with relevant block diagram.	5M	CO3	L2
(b)	Obtain the loaded Q of an FM receiver if incoming signal frequency is 90MHz and image frequency rejection ratio is 10 and 20.	5M	CO3	L3
	(OR)			
9(a)	Discuss about automatic gain control in super heterodyne radio receivers.	5M	CO3	L2
(b)	Calculate the image frequency ration for an AM receiver having loading factor of 150 when (i) Input signal frequency is 600 KHz (ii)Input signal frequency is 1000KHz.	5M	CO3	L3
10.	Examine the statement that figure of merit for DSBSC AM is unity.	10M	CO4	L3
	(OR)			
11(a)	Discuss the process of demodulating Pulse width modulated (PWM) signal with required waveforms.	5M	CO4	L2
(b)	Compare different pulse modulation techniques.	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. (IV Semester) Regular/Supplementary Examinations

23EE08-INDUCTION AND SYNCHRONOUS MACHINES

(EEE)

Time : 3 hours Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	What is the speed of the rotor field in space?	2M	CO1	L1
(b)	State the applications of various types of induction motors.	2M	CO1	L1
(c)	State the ratios:(i) Full load and maximum torques (ii) Starting and maximum torques.	2M	CO1	L2
(d)	State the relation between rotor input, rotor copper losses and gross mechanical power developed.	2M	CO1	L1
(e)	Why capacitor-start induction motors are advantageous?	2M	CO2	L1
(f)	Why single-phase induction motor has two windings on its stator?	2M	CO2	L1
(g)	What are the factors that contribute reduction in terminal voltage of a loaded alternator?	2M	CO3	L2
(h)	Define armature reaction in an alternator.	2M	CO3	L1
(i)	State the different methods used to minimize hunting.	2M	CO4	L1
(j)	What are the different excitations of a synchronous motor?	2M	CO4	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Derive the equations of Rotor EMF and Rotor Frequency, Rotor Reactance, Rotor Current and Power factor of Three Phase Induction Motor.	5M	CO1	L2
(b)	A 3-phase, 5 HP, 210V, 50 Hz, Induction motor runs at 1756 rpm when it delivers rated output power. Determine (i) Number of poles (ii) slip at full load (iii) frequency of rotor current.	5M	CO1	L3
	(OR)			
3(a)	Derive the equivalent circuit of 3-phase Induction Motor.	5M	CO1	L3
(b)	In a 6-pole, 3-phase, 50 Hz motor with star connected rotor, the rotor resistance per phase is 0.3 Ω, the reactance at standstill is 1.5 Ω, and an emf between slip rings on open circuit is 175V. Find (i) Slip at a speed of 950 rpm (ii) Rotor emf per phase (iii) Rotor frequency and reactance at a speed of 950 rpm.	5M	CO1	L3
4.	A 29.84KW, 3-phase, 50Hz Y-connected Induction Motor has the following test results. No-load test: 415V,21A,1335W, Short-circuit test: 100V, 45A, 2730W. Draw Circle diagram and Determine slip, power factor and efficiency.	10M	CO1	L3
	(OR)			
5(a)	Describe the operation of double cage rotor in 3-phase induction motor.	5M	CO1	L2
(b)	Describe the working of DOL starter in 3-phase Induction Motor.	5M	CO1	L2
6(a)	Describe the working of shaded pole induction motor.	5M	CO2	L2
(b)	Discuss the operation of capacitor start Induction Motor.	5M	CO2	L2
	(OR)			
7(a)	Discuss the equivalent circuit of 1-phase Induction Motor.	5M	CO2	L2
(b)	List the applications of capacitor start and capacitor run Induction Motors.	5M	CO2	L2
8(a)	Derive the EMF equation of 3-phase alternator.	5M	CO3	L3
(b)	The stator of a 3-phase, 16-pole alternator has 144 slots and there are 4 conductors per slot connected in two layers and the conductors of each phase are connected in series. If the speed of the alternator is 375 r.p.m., calculate the e.m.f. inducted per phase. Resultant flux in the air-gap is 5×10^{-2} webers per pole sinusoidally distributed. Assume the coil span as 150° electrical.	5M	CO3	L3
	(OR)			
9.	A 3.5 MVA, Y-connected alternator rated at 4160 volts at 50-Hz has the open-circuit characteristic given by the following data :	10M	CO3	L3

Field Current (A)	50	100	150	200	250	300	350	400	450
EMF (V)	1620	3150	4160	4750	5130	5370	5550	5650	5750

A field current of 200 A is found necessary to circulate full-load current on short-circuit of the alternator. Calculate the full- load voltage regulation at 0.8 p.f. lagging by using ampere turn method. Neglect resistance.

10(a)	Illustrate the 'V' and 'inverted V' curves in synchronous motor.	5M	CO4	L2
(b)	A 3 phase, 400 volt synchronous motor takes 52.5 Amps at a p.f of 0.8 leading. Calculate the power supplied and the induced emf. The motor impedance per phase is (0.25+j3.2) ohm.	5M	CO4	L2
	(OR)			
11(a)	Discuss the constructional features of 3-phase Synchronous Motor.	5M	CO4	L2
(b)	Derive the equation of power developed in the 3-phase Synchronous Motor.	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.

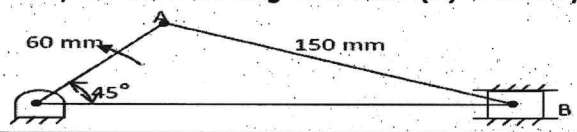
B.Tech. (IV Semester) ~~Regular~~/Supplementary Examinations

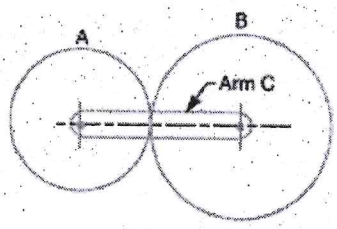
Average 6/12/25

23ME08-THEORY OF MACHINES

(ME)

Time : 3 hours | Max. Marks : 70

Q.No	Compulsory Question	Marks	CO	BL
1(a)	List out the inversions of a double slider chain.	2M	CO1	L1
(b)	Write the purpose of using Hooke's joint with an application.	2M	CO1	L1
(c)	Differentiate absolute & relative velocities.	2M	CO2	L1
(d)	If a crank of length 150mm is rotating with an angular acceleration of 2rad/sec^2 velocity. Compute the value of tangential acceleration.	2M	CO2	L1
(e)	Write the effect of gyroscopic couple on ship due to pitching.	2M	CO3	L1
(f)	State law of gearing.	2M	CO3	L1
(g)	Write the equations for static balancing of a number of masses rotating in different planes.	2M	CO4	L1
(h)	List out the necessary elements of cam drives.	2M	CO4	L1
(i)	Give any difference between longitudinal and transverse vibrations.	2M	CO5	L1
(j)	Describe the function of flywheel.	2M	CO5	L1
Q.No	**All questions carry equal marks**	**Marks**	**CO**	**BL**
2(a)	Derive the condition to be satisfied by a mechanism required to produce an exact straight line motion.	5M	CO1	L3
(b)	Determine the maximum permissible angle between the shaft axes of a universal joint if the driving shaft rotates at 800 rpm and the total fluctuation of speed does not exceed 60 rpm. Also, find the maximum and the minimum speeds of the driven shaft.	5M	CO1	L3
	(OR)			
3.	Discuss various inversions of 4-bar chain with illustrations.	10M	CO1	L2
4(a)	Discuss the three types of instantaneous centres for a mechanism.	5M	CO2	L2
(b)	In a slider crank mechanism crank rotates of 300 rpm in a counter clockwise direction. Determine (i) Angular velocity of connecting rod and (ii) Velocity of slider. 	5M	CO2	L4
	(OR)			
5(a)	Discuss the procedure to draw acceleration polygon of slider crank mechanism with a neat sketch.	5M	CO2	L2
(b)	Derive an expression for the magnitude and direction of coriolis component of acceleration.	5M	CO2	L3
6(a)	Discuss the effect of the gyroscopic couple on a two wheeled vehicle when taking a turn.	5M	CO3	L2
(b)	An aeroplane makes a complete half circle of 50 metres radius, towards left, when flying at 200 km per hr. The rotary engine and the propeller of the plane has a mass of 400 kg and a radius of gyration of 0.3 m. The engine rotates at 2400 r.p.m. clockwise when viewed from the rear. Find the gyroscopic couple on the aircraft and state its effect on it.	5M	CO3	L3
	(OR)			

7(a)	Two teeth in mesh have a module of 8mm and a pressure angle of 20^0 involute profile. The larger gear has 57 while the pinion has 23teeth. If the addenda on pinion and gear wheels are equal to one module, find (i) the number of pairs of teeth in contact (ii) the angle of action of the pinion and the gear wheel.	5M	CO3	L3
(b)	In an epicyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 rpm in the anticlockwise direction about the centre of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed makes 300 rpm in the clockwise direction, Calculate the speed of gear B.  	5M	CO3	L4
8(a)	Enumerate the steps involved in balancing of several masses rotating in the same plane.	5M	CO4	L2
(b)	A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance.	5M	CO4	L4
	(OR)			
9.	Draw the profile of a cam in which a knife-edged follower is raised with uniform acceleration and retardation, and is lowered with SHM. Least radius of cam = 60 mm; Lift of follower = 45 mm; Angle of ascent = 60^0; Angle of dwell between ascent and descent = 40^0; Angle of descent = 75^0.	10M	CO4	L4
10(a)	Derive the expression for natural frequency in case of un-damped free vibrations.	5M	CO5	L3
(b)	An instrument vibrates with a frequency of 1 Hz when there is no damping. When the damping is provided, the frequency of damped vibrations was observed to be 0.9 Hz. Find (i) the damping factor, and (ii) logarithmic decrement.	5M	CO5	L3
	(OR)			
11.	A shaft fitted with a flywheel rotates at 250 r.p.m. and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000N-m uniformly during 1/2 revolution and remains constant for the following revolution. It then falls uniformly to 750 N-m during the next 1/2 revolution and remains constant for one revolution, the cycle being repeated thereafter. Determine the power required to drive the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg with radius of gyration of 600 mm.	10M	CO5	L4

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