R23

II B.TECH II SEM

REGULAR

END EXAMINATION QUESTION PAPERS

MAY/JUNE 2025

NARASARAOPETA ENGINEEERING COLLEGE::NARASARAOPET

(AUTONOMOUS)

II B.Tech II Semester Regular. Examinations, May-2025

Sub Code: R23CC22MC **ENVIRONMENTAL STUDIES**

(ECE, CSE (AIML), CSE (CS), CSE (DS), AIML, & EEE)

Time: 3 hours Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q. No		Question	KL	CO	Marks
1	a	What is deforestation, mention any two causes of deforestation	1	1	2M
	b	Write about the benefits of dams.	1	1	2M
	c	Define biodiversity	1	2	2M
	d	What is Food Chain, mention with examples	1	2	2M
	e	Give an account of indoor air pollution.	1	3	2M
	f	What are the major sources of soil pollution	1	3	2M
	g	What is a watershed?	1	4	2M
	h	What do you mean by sustainable development?	1	4	2M
	i	What is meant by population stabilization?	1	5	2M
	j	Briefly discuss HIV/AIDS	1	5	2M

PART-B

All Questions Carry Equal Marks Max. Marks: 5x10=50M

UNIT-1

2. A) Define the environment? Why environmental studies considered as a multi-disciplinary subject? What is the scope, importance of environmental education? (CO1 K3 10 M)

OR

B) Discuss the major uses of forests. How would you justify that ecological uses of forests surpass commercial uses?(CO1 K2 10 M)

UNIT-1I

3. A) What are ecological pyramids? Explain why some of these pyramids are upright while others are inverted in different ecosystems? (CO2 K2 10M)

OR

B) Explain various values in biodiversity? Explain about India as a mega-diversity nation. (CO2 K2 10 M)

UNIT-1II

4. A) List the major physiological effects of air pollution on plants, environment and human beings? (CO3 K2 10 M)

OR

B) Classified solid waste? What adverse effects can solid waste cause? How can the solid waste be managed? (CO3 K1&K2 10 M)

UNIT-1V

5. A) What do you mean by sustainable development? What are the major measures to attain sustainability? (CO4 K2 10 M)

OR

B) What is a watershed? Critically discuss the objectives and practices of watershed Management. (CO4 K4 10 M)

UNIT-V

6. A) Discuss the environmental and social impacts of growing population. With a neat diagram. Explain the variation in population growth among various nations (CO5 K3 10 M)

OR

B) Explain the role of information technology in environment and human health. (CO5 K2 10 M)

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23CC2201 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Time: 3 hours (CE, CSE, ECE, EEE, CYS) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Managerial Economics.	1	1	2M
	b	Describe Demand Elasticity.	1	1	2M
	c	Explain about the Production Function.	2	2	2M
	d	Define Break Even Analysis.	1	2	2M
	e	Explain about Business Organization.	2	3	2M
	f	Outline the Monopolistic Competition Market.	1	3	2M
	g	Discuss the nature of Capital Budgeting.	2	4	2M
	h	Define the concepts of Working Capital Management.	1	4	2M
	i	List out the merits of Double Entry System.	1	5	2M
	j	Write about the Trading Account.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		**Unit-I**			
	a	i) Classify the various types of Demand Elasticity.	2	1	5M
		ii) Examine the significance of Managerial Economics	3	1	5M
		OR			
	b	i)Classify the various methods of Demand Forecasting.	2	1	5M
		ii)Illustrate the exceptions of Demand.	3	1	5M
3		**Unit-II**			
	a	i)Elaborate the Production function with One and Two variable inputs.	2	2	5M
		ii) Illustrate the Isoquants and Isocosts.	3	2	5M
		OR			
	b	i) Calculate the Profit Volume Ratio from the following data of PQ Limited.	4	2	5M

	Sales	Total Cost
2016	Rs.2,00,000	Rs.1,60,000
2017	Rs.2,40,000	Rs.1,80,000

		ii)Illustrate the various types of Costs.	3	2	5M

4		**Unit-III**			
	a	i) Elucidate the key features of Public Sector Undertakings.	4	3	5M
		ii) Write about the demerits of Sole Proprietorship.	3	3	5M
		OR			
	b	i) Classify the various types of Markets.	2	3	5M
		ii) Describe the various Pricing Methods.	2	3	5M
5		**Unit-IV**			
	a	i) Examine the various sources of Short – term Capital.	3	4	5M
		ii) Discuss the features of Capital Budgeting.	2	4	5M
		OR			
	b	i) Write a short note on Net Present Value (NPV).	3	4	5M
		ii) Examine the traditional methods of Capital Budgeting.	3	4	5M
6		**Unit-V**			
	a	i) Describe the process of Journalizing the transaction.	2	5	5M
		ii) Describe the various concepts of Accounting.	2	5	5M
		OR			
	b	i) Explain about the various tools of Financial Analysis.	2	5	5M
		ii) Classify the various types of Ratios.	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23CC2202 **PROBABILITY & STATISTICS**

Time: 3 hours (CSE, IT, CSE(AIML), AI, AIML) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A: Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Find the arithmetic mean of the following frequency distribution: x: 1 2 3 4 5 6 7 f: 5 9 12 17 14 10 6	3	1	2M
	b	Obtain the median for the following frequency distribution: x: 1 2 3 4 5 6 7 8 9 f: 8 10 11 16 20 25 15 9 6	3	1	2M
	c	If the two regression coefficients between x and y are 0.6 and 0.4, then the coefficient of correlation between them is?	3	2	2M
	d	The following table shows the sales and advertisement expenditure of a form Sales: Mean 40, S.D 10 Advertisement expenditure (Rs. Crores): Mean 6, S.D 1.5 Coefficient of correlation = 0.9. Estimate the likely sales for a proposed advertisement expenditure of Rs. 10 crores.	3	2	2M
	e	If from a pack of cards a single card is drawn, what is the probability that it is either a spade or a king?	3	3	2M
	f	A bag contains 5 white, 7 red, 6 black balls. Two balls are drawn at random. Find the probability that both will be red.	3	3	2M
	g	A distribution has a mean of 69 and a standard deviation of 420. Find the mean and standard deviation if a sample of 80 is drawn from the distribution.	3	4	2M
	h	Define sample and population in statistics.	3	4	2M
	i	What is the critical value?	3	5	2M
	j	What are type-I and type-II errors?	3	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Write the differences between the primary and secondary data	3	1	5M
		ii) Find the skewness for the given Data (2,4,6,6)	3	1	5M
		OR			
	b	i) Write any five difference between Population and Sample.	3	1	5M
		ii) Calculate Sample Kurtosis from the following grouped data X: 0 1 2 3 4 Frequency: 1 5 10 6 3	3	1	5M
3		Unit-II			
	a	i) Find linear regression equation for the following two sets of data: X: 2 4 6 8 Y: 3 7 5 10	3	2	5M
		ii) Calculate the correlation coefficient for the following data: X: 12 10 42 27 35 56 Y: 13 15 56 34 65 26	3	2	5M
		OR			
	b	i) Calculate the Spearman's Rank Correlation for the following data:	3	2	5M

			Mathematics	14	15	17	12	16	11	18	9	10				
			Accountancy	4	12	8	10	2	5	9	3	7				
		ii) Find the linear regression equation for the given data											3	2	5M
			x:	4	7	3	1								
			y:	6	5	8	3								
		Unit-III													
4	a	i) A continuous random variable has probability density function $f(x) = 3x^2$, $0 \leq x \leq 1$. Find a and b such that (a) $P(X \leq a) = P(X > a)$; and (b) $P(X > b) = 0.05$.											3	3	5M
		ii) A die is cast until 6 appears. What is the probability that it must be cast more than 5 times.											3	3	5M
		OR													
	b	i) A random variable X has the following probability distribution											3	3	5M
		X:	-2	-1	0	1	2	3							
		P(x):	0.1	k	0.2	2k	0.3	3k							
		(a) Find k, (b) Evaluate $P(X < 2)$ and $P(-2 < X < 2)$													
		ii) If X is uniformly distributed over (0, 10) find (a) $P(X < 2)$; (b) $P(X > 8)$; and (c) $P(3 < X < 9)$.											3	3	5M
		Unit-IV													
5	a	i) The Determine the 95% confidence interval for the average number of hours studied per week by the group of the 50 students given a mean of the 20 hours and a standard deviation of the 4 hours.											3	4	5M
		ii) A fire truck manufacturer has determined, based on a sample of 80 trucks, that one model of truck will allow fire fighters to spray a stream of water an average of 40 yards. The standard deviation of this measure is thought to be 6 yards. Use a 95% confidence interval to find the maximum error of estimate for the distance water can be sprayed.											3	4	5M
		OR													
	b	i) Find the sample standard deviation for the data set: {3, 5, 7, 9, 11}.											3	4	5M
		ii) A sample of 40 cows is drawn to estimate the mean weight of a large herd of cattle. If the standard deviation of the sample is 96 kg, what is the maximum error in a 90% confidence interval estimate?											3	4	5M
		Unit-V													
6	a	i) The average score on a test is 80 with a standard deviation of 10. With a new teaching curriculum introduced it is believed that this score will change. On random testing, the score of 38 students, the mean was found to be 88. With a 0.05 significance level, is there any evidence to support this claim?											3	5	M
		ii) A survey on cars had conducted and determined that 60% of car owners have only one car, 28% have two cars, and 12% have three or more. Supposing that you have decided to conduct your own survey and have collected the data below, determine whether your data supports the results of the study. Use a significance level of 0.05. Also, given that, out of 129 car owners, 73 had one car and 38 had two cars.											3	5	5M
		OR													
	b	i) A company wants to improve its sales. The previous sales data indicated that the average sale of 25 salesmen was Rs.50 per transaction. After training, the recent data showed an average sale of Rs. 80 per transaction. If the standard deviation is Rs.15, find the t-score. Has the training provided improved the sales?											3	5	5M
		ii) A research team wants to study the effects of a new drug on insomnia. 8 tests were conducted with a variance of 600 initially. After 7 months 6 tests were conducted with a variance of 400. At a significance level of 0.05 was there any improvement in the results after 7 months?											3	5	5M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23CC2203 **OPERATING SYSTEMS** Max. Marks: 70

Time: 3 hours (CSE, IT, CYS)

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	How Dual- Mode Operation works?	1	1	2M
	b	Write the differences between monolithic kernel and microkernel.	1	1	2M
	c	Difference between process and thread.	1	2	2M
	d	What is the sequence of operation by which a process utilizes a resource?	1	2	2M
	e	Define Starvation in deadlock.	1	3	2M
	f	What is race condition? Five one example case.	1	3	2M
	g	Compare Multiprogramming with Fixed and Variable Partitioning.	1	4	2M
	h	Define Locality of reference.	1	4	2M
	i	What is relation between pathname and a working directory?	1	5	2M
	j	What criteria are important in choosing a file organization?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain the structure of operating system.	2	1	5M
		ii) Describe briefly different types of System calls	2	1	5M
		OR			
	b	i) Explain the different functions of an operating system and discuss the various services provided by an operating system.	2	1	5M
		ii) What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel architecture? What are the disadvantages of using the microkernel approach?	2	1	5M
3		Unit-II			
	a	i) What is thread? Explain thread structure.	2	2	5M
		ii) Explain the following term related to IPC: a) Race condition b) critical region	2	2	5M

		OR			
	b	i) Explain the effect of increasing the time quantum to an arbitrary large Number and decreasing the time quantum to an arbitrary small number for round robin scheduling algorithm with suitable example?	2	2	5M
		ii) Five batch jobs A to E arrive at same time. They have estimated running times 10,2,6,8,4 minutes. Their priorities are 3,2,5,4,1 respectively with 5 being highest priority. For each of the following algorithm determine mean process turnaround time. Ignore process swapping overhead. Round Robin (q=3), Priority Scheduling.	3	2	5M
4		Unit-III			
	a	i) A working couple has three babies. The babies cannot be left unattended: Any one from the couple must be present at home for the babies. Write a solution for synchronizing the parents with the babies.	3	3	5M
		ii) What is Semaphore? Give the implementation of Bounded Buffer Producer Consumer Problem using Semaphore.	2	3	5M
		OR			
	b	i) Explain various methods for recovery from deadlock.	2	3	5M
		ii) What is Deadlock Avoidance? Explain the use of Banker's Algorithm for Deadlock Avoidance with illustration.	2	3	5M
5		Unit-IV			
	a	i) Explain the concept of Segmentation for Memory Management. Explain why combined Paged Segmentation is used with illustration.	2	4	5M
		ii) Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming four frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each. LRU replacement, FIFO replacement.	3	4	5M
		OR			
	b	i) Explain the following allocation algorithms with example: 1) First-fit 2) Best-fit 3) Worst-fit.	2	4	5M
		ii) Explain hierarchical page table and inverted page table.	2	4	5M
6		Unit-V			
	a	i) Discuss the *Block size*, and *Keeping track of free blocks* related to disk space management.	2	5	5M
		ii) Disk requests come in to the disk for cylinders 10, 22, 20, 2, 40, 6 and 38. A seek takes 6 msec per cylinder move. How much seek time is for Closest cylinder next algorithm? Initially arm is at cylinder 20. Starting track at 100. The queue of pending request is, 55,58,39,18,90,160,150,38,184. Perform following scheduling algorithm: SCAN (elevator), SSTF.	3	5	5M
		OR			
	b	i) What is directory? Explain directory operation in details.	2	5	5M
		ii) Explain file system implementation using linked list with index and i-node.	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M:.Marks

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II.B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23CC2204 **DATABASE MANAGEMENT SYSTEMS**
Time: 3 hours (CSE, IT, CYS, CSE(AIML), AI, DS, AIML) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Name the types of data models used in DBMS.	K1	1	2M
	b	Define a relationship in an ER diagram.	K1	1	2M
	c	Explain the use of SELECT and UPDATE statements in SQL.	K2	2	2M
	d	Name any four basic operations in relational algebra.	K1	2	2M
	e	Define aggregate function? Give one example.	K1	3	2M
	f	List any two arithmetic operators used in SQL.	K1	3	2M
	g	Define functional dependency.	K1	4	2M
	h	What is a multivalued dependency (MVD)?	K1	4	2M
	i	Define ACID properties in the context of a transaction.	K1	5	2M
	j	What is a B+ Tree in indexing?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain why DBMS is advantageous over File Systems	K2	1	5M
		ii) Summarize various types of attributes in ER Model with examples	K2	1	5M
		OR			
	b	i) Infer in detail about the users of DBMS.	K2	1	5M
		ii) Draw an ER diagram for Banking Enterprise.	K3	1	5M
3		Unit-II			
	a	i) Demonstrate the following in SQL. a. Adding a new column to existing table. b. Increase the size of column in a table.	K2	2	5M
		ii) Consider the following schemas: Sailors (sid, sname, rating, age) Reserves (sid, bid, day) Boats (bid, bname, color) Write the following queries in relational algebra, and tuple relational Calculus: a. Find the name of sailors who have reserved boat 103. b. Find the names and ages of sailors with a rating above 7.	K3	2	5M

		OR			
	b	i) List and explain the common data types available in SQL.	K2	2	5M
		ii) Explain selection and projection operations in relational algebra with an example.	K2	2	5M
4		Unit-III			
	a	i) Consider the following schema: Employee (empid, ename, place, job, mgrid, deptid, salary, commission) Department (deptid, dname, location) Write SQL Queries for the following statements: a) Find the names of employees who are managers. b) Find the names of employees who have managers.	K3	3	5M
		ii) Explain about the following clauses with example queries. (i) Group by (ii) Order by	K2	3	5M
		OR			
	b	i) What is a join? Discuss different types of joins.	K2	3	5M
		ii) Differentiate between updatable views and non-updatable views?	K2	3	5M
5		Unit-IV			
	a	i) Explain insertion, deletion, and modification anomalies.	K2	4	5M
		ii) How to find closure of an attribute based on a given set of FDs? Write the steps of the algorithm and explain.	K3	4	5M
		OR			
	b	i) Explain the purpose of normalization and schema refinement.	K2	4	5M
		ii) Explain about Boyce Codd normal form with an example.	K2	4	5M
6		Unit-V			
	a	i) Explain read-only, write-only and read-before-write protocols in serializability.	K2	5	5M
		ii) Show how 2PL protocol ensures serializability.	K2	5	5M
		OR			
	b	i) Discuss about various lock based mechanisms used in concurrency control.	K2	5	7M
		ii) Discuss the advantages of using B+ Trees for indexing in databases.	K2	5	3M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
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II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23CC2205 **SOFTWARE ENGINEERING**

Time: 3 hours (CSE & IT) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Mention any two notable changes in software development practices.	K1	1	2M
	b	List the key differences between the Waterfall model and Agile development.	K2	1	2M
	c	What is the role of a software project manager?	K1	2	2M
	d	List any two types of formal specification techniques.	K2	2	2M
	e	Define cohesion and coupling in software design.	K1	3	2M
	f	What are the characteristics of a good user interface?	K2	3	2M
	g	What is smoke testing?	K1	4	2M
	h	Define software reliability.	K2	4	2M
	i	Define software maintenance	K1	5	2M
	j	Define software reverse engineering.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
		Unit-I			
2	a	i) Describe the notable changes in software development practices over the years.	K2	1	5M
		ii) Compare and contrast the Spiral model with the Waterfall model.	K4	1	5M
		OR			
	b	i) Describe the main features of Rapid Application Development (RAD) with examples.	K3	1	5M
		ii) Explain the key differences between exploratory software development and software engineering	K4	1	5M
		Unit-II			
3	a	i)Explain the COCOMO model for software cost estimation with an example.	K3	2	5M
		ii) Analyze different risk management strategies in software projects.	K4	2	5M
		OR			
	b	i) Describe various project size estimation metrics used in software project planning.	K3	2	5M
		ii) Compare Axiomatic and Algebraic specification techniques.	K4	2	5M
		Unit-III			
4	a	i) Draw and explain a sample Data Flow Diagram (DFD) for a Library Management System	K3	3	5M
		ii) List and explain the characteristics of a good user interface	K2	3	5M

		OR			
	b	i) Describe the SA/SD methodology in function-oriented design.	K2	3	5M
		ii) Explain component-based GUI development with suitable examples.	K3	3	5M
5		Unit-IV			
	a	i) Compare black-box and white-box testing techniques.	K4	4	5M
		ii) Describe the process of integration testing in software development.	K2	4	5M
		OR			
	b	i) Describe the SEI Capability Maturity Model and its significance.	K2	4	5M
		ii) Analyze the significance of ISO 9000 in software quality management.	K4	4	5M
6		Unit-V			
	a	i) Describe the characteristics of software maintenance and its types.	K2	5	5M
		ii) Explain how CASE tools support various phases of the software life cycle.	K2	5	5M
		OR			
	b	i) What is software reverse engineering? Mention its applications.	K2	5	5M
		ii) Describe any two software maintenance process models.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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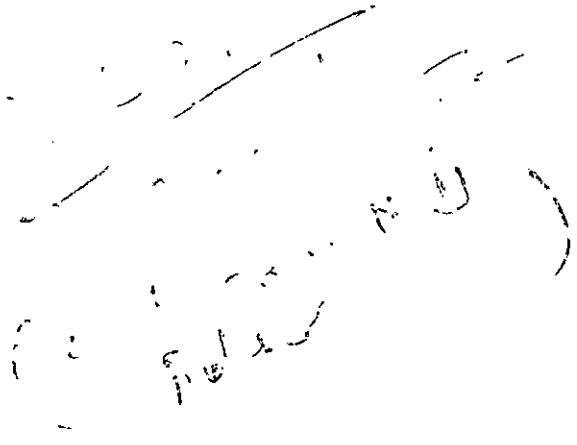

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23CC2206 **MACHINE LEARNING**

Time: 3 hours (CSE(AIML), AI, AIML) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is Data Acquisition? Give example.	1	1	2M
	b	Compare Learning by Induction, and Reinforcement Learning.	1	1	2M
	c	How to analyze Proximity Between Binary Patterns?	1	2	2M
	d	Identify the disadvantage of K- NN algorithm.	1	2	2M
	e	What are the importance of Boosting and Bagging?	1	3	2M
	f	Outline the significance of Bayes Classifier.	1	3	2M
	g	Write the feature of Kernel Trick	1	4	2M
	h	Justify the need of Back propagation of error in ML.	1	4	2M
	i	What is the primary goal of clustering in machine learning?	1	5	2M
	j	Compare Maximization-Based Clustering, and Fuzzy C-Means Clustering.	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain the Supervised learning with a Classification problem.	2	1	5M
		ii) Describe the concept of Overfitting, Training, Testing and Validation sets with examples.	2	1	5M
		OR			
	b	i) What is Model Prediction? Describe this mechanisms using a suitable example your choice.	2	1	5M
		ii) Explain what are the various metrics used to evaluate the machine learning model performance.	2	1	5M
3		Unit-II			
	a	i) Describe the working of K-Nearest Neighbor Classifier with example.	2	2	5M
		ii) Explain the working of KNN Regression.	2	2	5M
		OR			
	b	i) Describe how to assess the Performance of Classifiers.	2	2	5M
		ii) Provide a comparative description of Kernel based non-linear classifier, and Support Vector Regression.	2	2	5M

4		Unit-III			
	a	i) Describe in detail Classification and Regression Tree(CART).	2	3	5M
		ii) Elaborate the Decision Tree and explain the implementation of Decision Tree.	2	3	5M
		OR			
	b	i) Explain Multi-Class Classification with example.	2	3	5M
		ii) Briefly describe the Bayes Optimal Classifier's approach to balancing prior probabilities and evidence likelihood in classification?	3	3	5M
5		Unit-IV			
	a	i) Explain how to learn Multilayer Networks using Backpropagation Algorithm.	2	4	5M
		ii) Compare the Perceptron Convergence Theorem and Linear Regression with example.	2	4	5M
		OR			
	b	i) Illustrate some examples of using MLP and the four types of problems that are generally solved using MLP.	3	4	5M
		ii) Illustrate with diagrams of the XOR and SVM Regression.	2	4	5M
6		Unit-V			
	a	i) Explain in detail about K-Means Clustering algorithm.	2	5	5M
		ii) Explain Agglomerative Clustering with example.	2	5	5M
		OR			
	b	i) Describe Matrix Factorization with example.	2	5	5M
		ii) Describe Spectral Clustering with example.	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23CC2207 **DIGITAL LOGIC & COMPUTER ORGANIZATION**

Time: 3 hours (CSE(AIML), CSE(AI), AIML) Max. Marks: 70

Note: Question-Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Covert the number $2B_{16}$ into octal.	1	1	2M
	b	Give the truth table for NAND gate.	1	1	2M
	c	What is race condition in JK flip flop?	1	2	2M
	d	Distinguish between general-purpose Computer and Special-purpose computer.	1	2	2M
	e	Convert the decimal number -95 into *8 bit signed binary number*.	1	3	2M
	f	What is binary adder?	1	3	2M
	g	Distinguish between RAM and ROM.	1	4	2M
	h	Distinguish between maim memory and secondary memory.	1	4	2M
	i	What is hardware interrupt?	1	4	2M
	j	What is DMA?	1	4	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No			Questions	KL	CO	M
2			Unit-I			
	a	i)	Explain representation of a signed binary number with an example and also give the range of values(valid domain) for the 8 bit signed binary number.	3	1	5M
		ii)	Explain about logic gates.	2	1	5M
			OR			
	b	i)	Illustrate floating point representation with example	2	1	5M
		ii)	Explain Decoder and Multiplexers..	2	1	5M
3			Unit-II			
	a	i)	Explain about sequential circuits with example.	2	2	5M
		ii)	Distinguish between left Shift Registers and right, Shift Registers with examples.	2	2	5M
			OR			
	b	i)	Draw and explain the Basic Structure of Computers.	2	2	5M
		ii)	Discuss Von-Neumann Architecture	2	2	5M
4			Unit-III			
	a	i)	Discuss the algorithm for subtraction of two binary numbers.	2	3	5M
		ii)	Explain Booth algorithm.	2	3	5M

		OR			
	b	i) What are the phases in Execution of a Complete Instruction?	2	3	5M
		ii) Distinguish between Hardwired Control-Control unit and Micro programmed control unit	2	3	5M
5		Unit-IV			
	a	i) List different types of memories with examples and explain.	2	4	5M
		ii)Explain the need of cache memory.	2	4	5M
		OR			
	b	i) Explain Associative memory mapping.	2	4	5M
		ii) Give the advantages and disadvantages of secondary storages.	2	4	5M
6		Unit-V			
	a	i) Explain the process of accessing I/O Devices.	2	4	5M
		ii) Explain the significance of interrupts in accessing multiple I/O devices.	2	4	5M
		OR			
	b	i) What is the need of interrupts in the design of a computer?	2	4	5M
		ii) Distinguish between Synchronous bus and Asynchronous bus	2	4	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23CC2208 **OPTIMIZATION TECHNIQUES**

Time: 3 hours (IT, CSE (AIML), AI, DS, AIML) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define single variable optimization.	K1	1	2M
	b	List applications of Optimization techniques.	K1	1	2M
	c	What is the stopping criterion for the simplex method?	K1	2	2M
	d	What condition must be satisfied for a system of linear equations to have a unique solution?	K1	2	2M
	e	Define the MODI method.	K1	3	2M
	f	What is a balanced transportation problem?	K1	3	2M
	g	List any two characteristics of a constrained optimization problem.	K1	4	2M
	h	State the difference between interior and exterior penalty methods.	K1	4	2M
	i	What is sub-optimization in dynamic programming?	K1	5	2M
	j	Define the principle of optimality	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain in detail how to solve multivariable optimization problems with inequality constraints using Kuhn-Tucker (KKT) conditions.	K4	1	10M
		OR			
	b	i) Determine the maximum and minimum values of the function $f(x) = 4x^3 - 18x^2+27x - 7$	K3	1	10M
3		Unit-II			
	a	i) Explain the geometric interpretation of a linear programming problem with two variables.	K4	2	10M
		OR			
	b	i) Use the graphical method to solve the following LP problem: Maximize $Z=3x+2y$ subject to $x+y \le 4$, $x \le 2$, $y \le 3$, $x,y \ge 0$	K4	2	M
4		Unit-III			
	a	i) Explain the procedure for finding an initial basic feasible solution using the Least Cost Method with example	K4	3	10M
		OR			
	b	i) Describe how the North-West Corner Rule assigns values in a transportation table.	K3	3	5M
		ii) Explain the significance of opportunity cost in the MODI method.	K4	3	5M

5		Unit-IV			
	a	i) Explain the classification of one-dimensional minimization methods.	K4	4	10M
		OR			
	b	i)Use the Fibonacci method to minimize a function $f(x) = x^2 + 3x + 2$ over the interval [0, 4].	K4	4	10M
6		Unit-V			
	a	i) Apply dynamic programming to maximize $Z=y_1^2+y_2^2+y_3^2$ subjected to $y_1+y_2+y_3=10$	K3	5	10M
		OR			
	b	i) Summarize the computational steps involved in dynamic programming.	K2	5	5M
		ii) Describe how dynamic programming differs from linear programming.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular/Supple. Examinations, June-2025 **R23**

Sub Code: R23CE22MC **BUILDING MATERIAL & CONSTRUCTION**

Time: 3 hours **(CIVIL ENGINEERING)** Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from PART-A is compulsory (10 x 2M= 20M)

Q.No		Questions	KL	CO	M
1	a	What are the qualities of good building stones?	K2	CO1	2M
	b	Write different classification of stones and their uses in brief.	K1	CO1	2M
	c	Discuss the general principles in Brick Masonry Construction	K1	CO2	2M
	d	Write different classification of wood?	K1	CO2	2M
	e	What are the various uses of lime	K2	CO3	2M
	f	What is the chemical composition of Portland cement?	K2	CO3	2M
	g	Discuss the advantages of flat roof over sloped roof.	K1	CO4	2M
	h	How are the treads and risers proportioned?	K2	CO4	2M
	i	Define paint, varnish and Floor finishing.	K1	CO5	2M
	j	Discuss about particle shape and texture?	K1	CO5	2M

PART-B

Answer either a or b from each question of **PART-B** (5 x 10M= 50M)

Q.No		Questions	KL	CO	M
		Unit-I			
2	a	i) Give the sketches of various finishing surfaces of stones.	K2	CO1	5M
		ii) Compare Pan Tiles and Pot Tiles with neat sketches.	K2	CO1	5M
		OR			
	b	i) Describe the process of blasting?	K2	CO1	5M
		ii) Explain the various types of tiles and their use for buildings	K2	CO1	5M
		Unit-II			
3	a	i) What are bond stones and for what type of stone masonry it is used?	K2	CO2	5M
		ii) Explain defects due to seasoning.	K2	CO2	5M
		OR			
	b	i) Explain the qualities of a good timber	K2	CO2	5M
		ii) Explain English bond and Flemish bond with neat sketches	K2	CO2	5M
		Unit-III			
4	a	i) Explain briefly various methods of manufacture of lime	K2	CO3	5M
		ii) What is the chemical composition of Portland cement?	K3	CO3	5M
		OR			
	b	i) Explain any two laboratory test for cement?	K2	CO3	5M
		ii) Describe in detail how lime is manufactured?	K2	CO3	5M
		Unit-IV			
5	a	i) Classify various types of lintels and discuss their relative use.	K2	CO4	5M
		ii) Explain coupled roof with sketch.	K2	CO4	5M

		OR			
	b	i) Write a short note on Arches, Vaults, and Stair cases.	K2	CO4	5M
		ii) Write the difference between Retarders and accelerators.	K2	CO4	5M
		Unit-V			
6	a	Explain in detail about Damp Proofing and water proofing materials?	K2	CO5	10 M
		OR			
	b	i) Indicate the type of paints used for old wood work and new iron work.	K2	CO5	5M
		ii) What are the considerations in application of these paints to the ceiling under the wet areas and wall surfaces?	K2	CO5	5M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23CE2202 **ENGINEERING GEOLOGY**

Time: 3 hours (CE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What are the geological agents	1	1	2M
	b	What are the types of Rivers	1	1	2M
	c	Define the term Mineralogy	1	2	2M
	d	Define the terms Strike & Dip	1	2	2M
	e	What are different causes of Earthquakes?	1	3	2M
	f	What are the types of Unconformity?	1	3	2M
	g	What are the Internal causes of Landslides?	1	4	2M
	h	What are the types of Joints	1	4	2M
	i	What is the importance of lining in tunnels?	1	5	2M
	j	Write the uses of reservoirs	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	Give a brief account of the importance of geology in civil engineering. Explain your answer by giving suitable example	2	1	10M
		OR			
	b	Describe in detail, the process of weathering of rocks. Add a note on the effect of weathering on the strength of rocks.	2	1	10M
3		Unit-II			
	a	i) How sedimentary rocks are formed? Mention the important properties of sedimentary	2	2	5M
		ii) Briefly explain about origin of igneous rocks? Explain the texture and structures of igneous rocks	2	2	5M
		OR			
	b	i) Explain the engineering properties and description of Granite, Shale, Marble and Slate.	2	2	5M
		ii) Describe the physical properties of minerals (i) Asbestos and (ii) Hematite.	2	2	5M
4		Unit-III			
	a	i) Classify and describe different types of joints in rock with neat sketches	2	3	5M
		ii) Explain about Dip and Outcrop study of common geological structures	2	3	5M

		OR			
	b	Classify and describe the different types of faults in rocks and explain how they are recognized in the field?	2	3	10M
5		Unit-IV			
	a	i) Describe the various effects of an earthquake? How do we locate the epicenter of an earth quake?	2	4	5M
		ii) Write about the Principles of Geophysical study by Magnetic method	2	4	5M
		OR			
	b	i)What are the advantages and uses of geophysical prospecting and explain gravity method of geophysical prospecting	2	4	5M
		ii) What are landslides? What are their causes? How landslides can be prevented?	2	4	5M
6		Unit-V			
	a	i) Explain about Geological considerations in the selection of a Dam site	2	5	5M
		ii) What are Dams and Reservoirs? Discuss the different types of dams giving geological reasons	2	5	5M
		OR			
	b	What is a tunnel? Explain the terms that are used in tunnels with neat sketches? Explain the purpose of tunnelling	2	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23CE2203 **CONCRETE TECHNOLOGY**

Time: 3 hours (CE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Short note on raw materials used for the manufacture of cement?	1	1	2M
	b	List the some mineral admixtures used in concrete?	1	1	2M
	c	What are the fresh properties of concrete?	1	2	2M
	d	What is shotcrete concrete?	1	2	2M
	e	Define the gel/space ratio?	1	3	2M
	f	List out the factors influencing the compressive strength of concrete.	1	3	2M
	g	Write brief note on flexural strength of concrete	1	4	2M
	h	State the effect of creep in concrete	1	4	2M
	i	What are the different types of special concrete	1	5	2M
	j	List out the concepts of mix proportioning.	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i)Explain about hydration of cement	2	1	5M
		ii) Explain about the quality of mixing water in concrete	2	1	5M
		OR			
	b	i) Explain different methods of measurement of moisture content of aggregates	2	1	5M
		ii) What is alkali aggregate reaction? What are the factors promoting alkali aggregate reaction?	2	1	5M
3		Unit-II			
	a	Define the term workability. What are the various tests conducted to determine the Workability of concrete and explain them.	2	2	10M
		OR			
	b	i) Write about segregation and bleeding.	2	2	5M
		ii) Explain the various steps in the manufacture of concrete	2	2	5M
4		Unit-III			
	a	i) What are the two non-destructive tests commonly used to assess the Compressive strength? Explain any one method.	2	3	5M
		ii) Explain the relation between compression and tensile strength.	2	3	5M

		OR			
	b	i) Explain Maturity concept of concrete?	2	3	5M
		ii) Discuss the Abrams water/cement ration law and its significance. How strength of concrete is estimated by w/c ratio law.	2	3	5M
5		Unit-IV			
	a	i) What are the factors that affect the shrinkage and creep of concrete? Explain in details	2	4	5M
		ii)) Describe the mechanism of drying shrinkage of concrete	2	4	5M
		OR			
	b	i) Explain in detail the classification of Shrinkage.	2	4	5M
		ii) Define Creep and explain how creep is measured	2	4	5M
6		Unit-V			
	a	i) What is self-compacting concrete (SCC) and state some of the advantages of SCC.	2	5	5M
		ii) What is meant by high performance concrete? Explain the properties and uses	2	5	5M
		OR			
	b	Design a concrete mix for M30 grade concrete by IS method using the following data. Characteristics compressive strength 30Kpa Maximum size of aggregates: 20mm angular Degree of quality of concrete: good Types of exposure: severe Compaction factor:0.87 Specific gravity of cement:3.15 Specific gravity of coarse aggregate:2.65 Specific gravity of fine aggregate:2.68 Water absorption of coarse aggregate:1.2% Water absorption of fine aggregates:1.5% Grading of coarse aggregate: confirms to table 2of IS:383-1970 Grading of fine aggregate: confirm to zone 111 of IS 383-1970.	2	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23CE2204 **STRUCTURAL ANALYSIS**

Time: 3 hours (CE) Max. Marks: 70

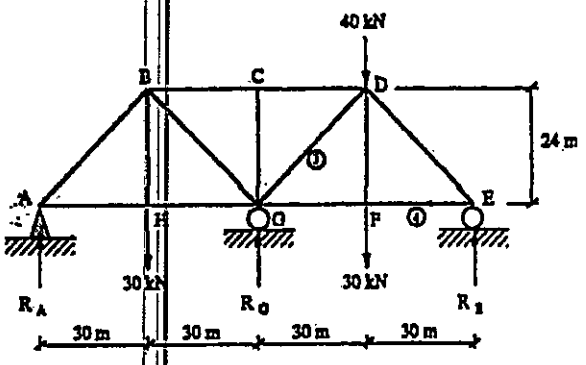
Note: Question Paper consists of Two parts (Part-A and Part-B)

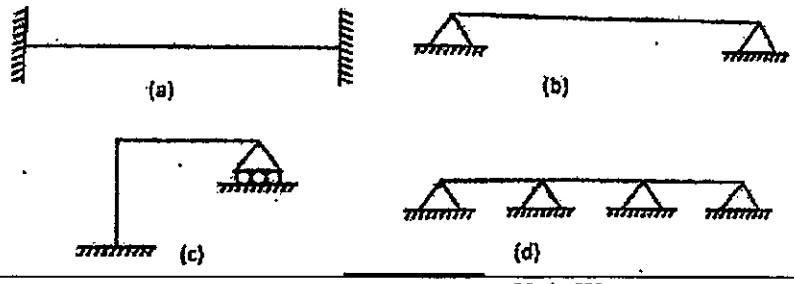
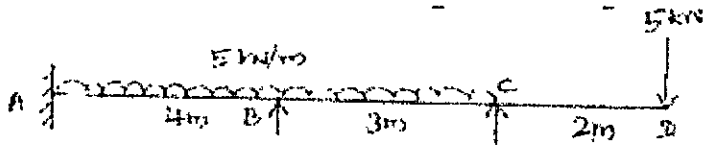
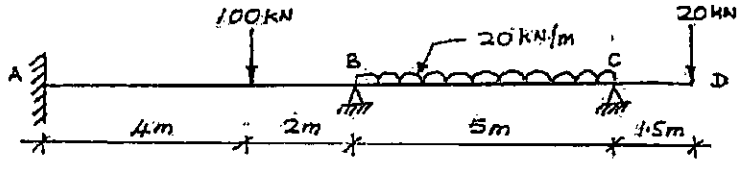
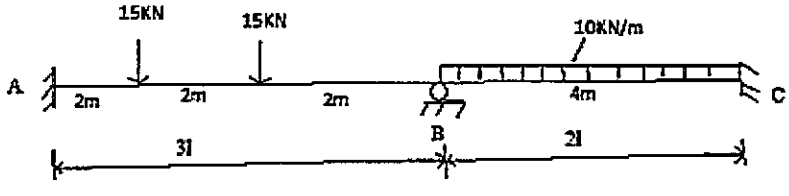
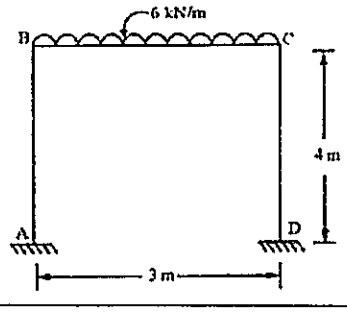
PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define shear force	1	1	2M
	b	What is meant by indeterminate structures	1	1	2M
	c	What are the advantages of Continuous beam over simply supported beam	1	2	2M
	d	Draw SFD and BMD for simply supported beam with UDL	1	2	2M
	e	What is a fixed beam	1	3	2M
	f	What is the limitation of slope-deflection equations applied in structural analysis?	1	3	2M
	g	What is deflection	1	4	2M
	h	Does the moment distribution method can be used to analyze the determinate structures?	1	4	2M
	i	What is stiffness factor?	1	5	2M
	j	Define strain energy	1	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	Determine the deflection of the free end of cantilever of length L subjected to a point load 'W' at the free end. Use Strain Energy method	3	1	10M
		OR			
	b	Derive Castigliano's first theorem	2	1	10M
3		Unit-II			
	a	Prove the truss is external statically indeterminate. Determine the reactions and internal forces of the trusses. The modulus of elasticity (E) of each member is constant. 	3	2	10M
		OR			
	b	i) Determine the degree of static indeterminacy and degree of kinematic indeterminacy	•	2	10M

		of the beams shown below.  			
4		Unit-III			
	a	A fixed beam of length 6 m carries two point loads of 30 kN each at a distance of 2 m from both ends. Determine the fixed end moments and draw BMD.	3	3	10M
		OR			
	b	Calculate the fixed end moments and the reactions at the supports for a fixed beam AB of length 6 m. The beam carries point loads of 160 KN and 120 KN at a distance of 2 m and 4 m from the left end A. Draw SFD & BMD.	3	3	10M
5		Unit-IV			
	a	Examine the given continuous beam and draw its BMD and SFD using slope deflection method. EI=Constant  	3	4	10M
		OR			
	b	Analyse the continuous beam ABCD shown in fig by slope deflection method. The support B sinks by 15mm. Take E=200X10^5 KN/m^2 and I=120X10^{-6}m^4  	3	4	10M
6		Unit-V			
	a	Analyze the two span continuous beam by moment distribution method  	3	5	10M
		OR			
	b	Analyse the frame by moment distribution method and draw bending moment diagram  	3	5	10M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23CE2205 **HYDRAULICS & HYDRAULIC MACHINERY**

Time: 3 hours (CE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define stoke's law.	K2	1	2M
	b	Write a note on boundary layer theory.	K1	1	2M
	c	What do you know about critical depth in an open channel flow?	K2	2	2M
	d	What are the geometrical parameters of a channel?	K1	2	2M
	e	What is the significance of critical flow?	K2	3	2M
	f	Define specific energy.	K1	3	2M
	g	How will you classify the turbines?	K2	4	2M
	h	Define the term Jet propulsion.	K2	4	2M
	i	Define the terms suction head and delivery head.	K1	5	2M
	j	Write about cavitation in the pump.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	Explain the laminar flow through circular pipes and parallel plates in detail.	K3	1	10M
		OR			
	b	Discuss the Resistance to flow of fluid in smooth and rough pipes.	K3	1	10M
3		Unit-II			
	a	A rectangular channel of 6 m wide carries water at a depth of 4 m. If the bed slope of the channel is 1 in 1000, find the rate of flow. Assume Manning's coefficient n= 0.027.	K3	2	10M
		OR			
	b	Derive the condition for most efficient Trapezoidal channel section for uniform flow.	K3	2	10M
4		Unit-III			
	a	(i) What is hydraulic jump and derive the expression for depth of hydraulic jump	K3	3	5M
		(ii) A hydraulic jump forms at the downstream end of spillway carrying 17.93 m^3 /s discharge. If depth before jump is 0.80 m, determine the depth after the jump and energy loss.	K3	3	5M

		OR			
	b	What do you mean by critical velocity? Obtain the expression for critical velocity in terms of critical depth.	K3	3	5M
5		Unit-IV			
	a	A Pelton wheel has a mean bucket speed of 10 meters per second with a jet of water flowing at the rate of 700 liters/s under a head of 30 meters. The buckets deflect the jet through an angle of 160^0 . Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.9g.	K3	4	10M
		OR			
	b	A jet of water of 60 mm diameter strikes a curved vane at its centre with a velocity of 18 m/s. The curved vane is moving with a velocity of 6 m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assuming the plate to be smooth find: (i) Thrust on the plate in the direction of jet, (ii) Power of the jet, and (iii) Efficiency of the jet.	K3	4	10M
6		Unit-V			
	a	The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/s and vanes are set back at an angle of 45^0 at outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 75%	K3	5	10M
		OR			
	b	What is reciprocating pump? Explain the parts of reciprocating pump and derive the condition for work done.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

R23

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EE2202 **ANALOG CIRCUITS**

Time: 3 hours (EEE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is Trans resistance amplifier?	1	1	2M
	b	What is power amplifier?	1	1	2M
	c	Define non linear wave shaping?	1	2	2M
	d	Draw the Emitter coupled clipper circuit?	2	2	2M
	e	What is practical operational amplifier?	1	3	2M
	f	What are the characteristics of Op-Amps?	1	3	2M
	g	What are the modes of operation of a timer?	1	4	2M
	h	Define duty cycle D?	2	4	2M
	i	What is LPF filters?	1	5	2M
	j	What is dual slope ADC?	1	5	2M

PART-B:

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain the principle of feedback amplifier?	2	1	5M
		ii) Discuss the characteristics of negative feedback amplifiers?	3	1	5M
		OR			
	b	Explain the i) Voltage amplifier ii) Current amplifier?	2	1	10M
3		Unit-II			
	a	Explain the RC network as a differentiator and an integrator?	2	2	10M
		OR			
	b	Discuss the i) Diode series clippers ii) Diode parallel clippers	3	2	10M
4		Unit-III			
	a	i) Explain the DC characteristics of operational amplifier?	2	3	5M
		ii) Explain the inverting amplifier?	2	3	5M
		OR			
	b	Write short notes on i) Differential amplifiers ii) Log amplifiers	3	3	10M
5		Unit-IV			
	a	Briefly explain the Bistable and Astable multivibrators using Op-Amp?	4	4	10M

		OR			
	b	i) Solve for the free running frequency of oscillations of a Astable multivibrator using 555 timer? Given R_a = 6.8 kilo ohm, R_b = 3.3 kilo ohms, C = 0.1 micro farads?	3	4	5M
		ii) Explain the functional diagram of 555 timer?	2	4	5M
6		Unit-V			
	a	i) Write the merits of active filters over passive filters?	2	5	5M
		ii) Explain the HPF filters?	2	5	5M
		OR			
	b	Discuss the i) Successive approximation ADC ii) Inverted R-2R DAC?	3	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
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II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23EE2203 **POWER SYSTEMS-I**

Time: 3 hours (EEE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	How are hydro plants classified?	K2	1	2M
	b	Discuss why overall efficiency of Themal Power Plant is very low	K1	1	2M
	c	What is the function of control rods in nucelar reactor?	K2	2	2M
	d	List the advantages of a Nuclear Power Station	K1	2	2M
	e	Define Air Insulated Substation	K1	3	2M
	f	What is the need of a Substation in the power system?	K1	3	2M
	g	List out the types of Cables	K1	4	2M
	h	Write the classification of AC Distribution system.	K1	4	2M
	i	Define various types of Tariff in electric power system	K2	5	2M
	j	Define Load Factor	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i)Explain the criterion for Hydro power plant site Selection	K3	1	5M
		ii)Describe various types of Draft Tubes	K2	1	5M
		OR			
	b	i)Draw the single line diagram of Hydro electric power plant.	K3	1	5M
		ii)Write the functions of Economizer and Super Heaters	K2	1	5M
3		Unit-II			
	a	i)Discuss the disadvantages of Nuclear Power plant	K2	2	5M
		ii)Explain the working principle of Nuclear Power Plant	K2	2	5M
		OR			
	b	i)What are the basic components of Nuclear Reactor?	K2	2	5M
		ii)Explain Fissile and fertile materials used in Nuclear Power station	K2	2	5M
4		Unit-III			
	a	i)Explain the constructional aspects of Gas Insulated Substations	K2	3	5M
		ii)Write the advantages and Disadvantages of Gas Insulated Substations	K2	3	5M
		OR			
	b	i)Describe main and transfer bus bar system with neat sketch.	K3	3	5M
		ii)Explain Sectionalized single bus bar.	K2	3	5M

5		Unit-IV			
	a	i)Explain briefly the various systems of AC Distribution.	K3	4	5M
		ii)What is grading of a cable? Write the formula for the capacitance of the single core cable.	K3	4	5M
		OR			
	b	i)Compare Ring main and Radial Distribution Systems	K2	4	5M
		ii) A 33kV, 3-phase, 2.5 km long feeder consists of single-core cables having a conductor radius of 12mm and an insulation thickness of 8mm.The dielectric has a relative permittivity of 3 and the power factor of the unloaded cable is 0.3. Determine the following (i) capacitance per phase (ii) charging current per phase	K3	4	5M
6		Unit-V			
	a	i)Explain in detail about the difference between Load curve and Load duration curve.	K2	5	5M
		ii) Explain Simple rate and Flat rate Tariff	K2	5	5M
		OR			
	b	i)Discuss the factors affecting the economics of power generation.	K2	5	5M
		ii)Explain how Load curves helps in the selection of size and number of generating units	K3	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EE2204 **INDUCTION & SYNCHRONOUS MACHINES**

Time: 3 hours (EEE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	A 6 pole, three phase Induction motor operating on a 50n HZ supply has a rotor EMF frequency 2 HZ. Determine i) Slip and ii) the rotor speed?	K1	1	2M
	b	What are the effects of increasing rotor resistance on starting How current and starting torque?	K1	1	2M
	c	How can the direction of rotation of a three phase induction motor be reversed?	K1	2	2M
	d	On what factors does the torque developed in a three phase induction motor depend?	K1	2	2M
	e	Name the different theories with which principle of single phase induction motors are explained?	K1	3	2M
	f	What will be the direction of a shaded pole single phase induction motor?	K1	3	2M
	g	What is a distributed winding?	K1	4	2M
	h	What is synchronous impedance of a alternator?	K1	4	2M
	i	How the synchronous motor is made self starting?	K1	5	2M
	j	What is synchronous condenser?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain the principal of a three phase induction motor?	K2	1	5M
		ii) If a three phase induction motor has a slip of 3% at rated voltage, deduce approximately the slip for developing the same torque at 10% below the rated torque?	K3	1	5M
		OR			
	b	i) Develop the equivalent circuit for a three phase induction motor?	K3	1	10M
3		Unit-II			
	a	With the help of neat connection diagrams explain the procedure for conducting no load and blocked rotor tests and compensation of equivalent circuit parameters?	K3	2	10M
		OR			
	b	04 pole, 50 HZ, 415V, 37 KW delta connected three phase induction motor gave the following test results No load test 415V, 16A, 1.75 Kw Blocked rotor test 100V,1 55A, 1.85 Kw Stator resistance per phase 0.45 Σ. Draw the circle diagram and predict the full load performance. Also find the ratios of full load torque to maximum torque and starting torque to full load torque?	K3	2	10M

4		Unit-III			
	a	i) Explain the Double field revolving field theory?	K2	3	5M
		ii) What is a split phase Induction motors? Explain?	K2	3	5M
		OR			
	b	Explain the following i) AC series motor ii) Shaded pole motors	K2	3	10M
5		Unit-IV			
	a	Explain the constructional features of salient pole and non salient pole alternators?	K2	4	10M
		OR			
	b	Explain in detail, MMF method of predetermining the voltage regulation of alternator?	K2	4	10M
6		Unit-V			
	a	i) Explain the principle of operation of synchronous motor?	K2	5	5M
		ii) Derive the expression for the power developed in a synchronous motor?	K3	5	5M
		OR			
	b	Explain the phenomena of hunting in synchronous motors and the methods adopted to minimize the effect of hunting?	K3	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EE2205 **CONTROL SYSTEMS**

Time: 3 hours (EEE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Name any two types of electrical analogies for the mechanical systems?	K1	1	2M
	b	State definition of transfer function?	K1	1	2M
	c	Define the steady state error of a feedback control system?	K1	2	2M
	d	Write down the expression for maximum Overshoot?	K1	2	2M
	e	Define polar plot	K1	3	2M
	f	What is Gain Margin?	K1	3	2M
	g	What are the two Bode plots?	K1	4	2M
	h	What is Lag Compensation?	K1	4	2M
	i	What is state Transition matrix?	K1	5	2M
	j	What is state diagram?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) What is Mason's gain formula and explain each term there in?	K2	1	5M
		ii) Distinguish between open loop and closed loop control systems?	K2	1	5M
		OR			
	b	A closed loop system is represented by the following differential equation $\frac{d^3c}{dt^3}+2\frac{d^2c}{dt^2}+4\frac{dc}{dt}=20e$ Where $e = r - 0.8c$. Identify the quantities c, r and e and draw block diagram to represent the system. Find the overall transfer function of the system?	K3	1	10 M
3		Unit-II			
	a	The open loop transfer of a feedback control system with unity feedback given by $G(s) = \frac{40}{s(1+0.5s)}$. Determining the error constants for the system. Also obtain the steady state error when the input is $r(t) = 1+5t+10t^2$?	K3	2	10 M
		OR			
	b	State and explain the rules for sketching the root loci for a feedback system?	K2	2	10 M

4		Unit-III			
	a	Draw the Bode magnitude plot for $G(s) = \frac{k}{s(1+sT_1)(1+ST_2)}$	K3	3	10 M
		OR			
	b	Sketch the Nyquist plot for $G(s)H(s) = \frac{200}{s(s+5)(s+10)}$ and determine whether (or)not the closed loop system is stable?	K3	3	10 M
5		Unit-IV			
	a	The open loop transfer function of a unity feedback system is $G(s) = \frac{k}{s(s+1)}$. It is desired to have the velocity error constant $K_v = 12\ Sec^{-1}$ and phase margin as 40^0. Design a lead compensator to meet the above specifications?	K3	4	10 M
		OR			
	b	Explain the Lag and Lead Compensators?	K3	4	10 M
6		Unit-V			
	a	A system is characterized by the following state space equations $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -2 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u,\ t>0$ $y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ Find i) the Transfer function of the system ii) Compute the state transition matrix iii) Solve the state equation for a unit step input under zero initial conditions	K3	5	10 M
		OR			
	b	Diagonalize the matrix $A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$	K3	5	10 M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23ME2201 **INDUSTRIAL MANAGEMENT**

Time: 3 hours (ME) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q. No		Questions	KL	CO	M
1	a	Mention two key developments in the history of Industrial Engineering.	1	1	2M
	b	List any two factors affecting plant location.	2	1	2M
	c	Name the two main techniques of work study.	1	2	2M
	d	Write one difference between batch production and mass production.	2	2	2M
	e	State the purpose of a control chart.	2	3	2M
	f	State any two objectives of ISO quality systems.	1	3	2M
	g	Write about zero defect concept	2	4	2M
	h	Write the full form of IRR and ARR.	1	4	2M
	i	Name any two wage incentive plans.	1	5	2M
	j	Define value engineering.	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of PART-B (5 x 10M = 50M)

Q. No		Questions	KL	CO	M
2		Unit-I			
	a	i) Define Industrial Engineering. Explain its scope and objectives in modern industries.	2	1	5M
		ii) Describe any five functions of management with suitable examples.	3	1	5M
		OR			
	b	Explain with neat sketches the different types of plant layouts. Also mention their advantages, disadvantages, and suitable applications.	3	1	10M
3		Unit-II			
	a	i) Explain the importance and applications of work study in industries.	2	2	5M
		ii) Describe the procedure for conducting a method study.	3	2	5M
		OR			
	b	Analyse the importance of ergonomics in work system design. How does poor ergonomics affect worker efficiency and safety?	3	2	10M

4		Unit-III			
	a	Explain the construction, interpretation, and applications of $\bar{X}$ and R charts with suitable numerical examples.	3	3	10M
		OR			
	b	Explain the Six Sigma concept. Describe its basic principles, methodology, and significance in quality improvement with examples.	3	3	10M
5		Unit-IV			
	a	i) Explain the nature and scope of financial management.	2	4	5M
		ii) Differentiate between fixed capital and working capital with examples.	2	4	5M
		OR			
	b	i) Explain the importance of capital budgeting decisions in financial management.	2	4	5M
		ii) Describe any three investment evaluation criteria used in capital budgeting.	2	4	5M
6		Unit-V			
	a	i) Explain the concept of Human Resource Management (HRM) and its importance in an organization.	3	5	5M
		ii) Explain job evaluation and its importance in wage determination.	3	5	5M
		OR			
	b	Describe the concept, goals, and major components of Enterprise Resource Planning (ERP).	3	5	10M

KL: Blooms Taxonomy Knowledge Level– CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23ME2202 COMPLEX VARIABLES,PROBABILITY & STATISTICS

Time: 3 hours (ME) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Consider $f(z) = z^2 + iz$, and express it in terms of real and imaginary parts.	3	1	2M
	b	When we say a complex valued function is continuous. Is $f(z) = z$ is continuous, justify your answer.	3	1	2M
	c	Find the radius of convergence of the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n}(z-2i)^n$.	3	2	2M
	d	Define isolated singularity and give an example.	1	2	2M
	e	What is the probability that 4 cards taken from a full pack of cards, 2 will be black and 2 will be red?	3	3	2M
	f	Define probability mass function and probability density function.	3	3	2M
	g	Define population and sample.	1	4	2M
	h	The mean time taken to read a newspaper is 8.2 minutes. Suppose the standard deviation is one minute. Take a sample of size 70. Find its mean and standard deviation.	3	4	2M
	i	Write the methods of sampling.	1	5	2M
	j	Briefly describe one and two tailed tests.	3	5	2M

PART-B: Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Show that $f(z) = \|z\|^2$ is continuous but not differentiable, at each point in the plane.	3	1	5M
		ii) Evaluate $\int_C \frac{e^{2z}}{z^2+1} dz$, where C is $\|z\| = 1/2$.	3	1	5M
		OR			
	b	i) Find the analytic region of $f(z) = (x - y)^2 + 2i(x + y)$.	3	1	5M
		ii) Evaluate $\int_C z^2 \, dz$, where C is the line joining the points (0, 0) and (4, 2).	3	1	5M
3		Unit-II			
	a	i) Expand $\log(1 + z)$ as a Taylor series about $z = 0$ where $\|z\| < 1$.	3	2	5M
		ii) Evaluate $\int_C \frac{z^2 - 4z + 4}{z+i} dz$, where C is $\|z\| = 2$.	3	2	5M
		OR			
	b	i) Find the Laurent's series of $f(z) = \frac{e^{2z}}{(z-1)^3}$ about $z = 1$.	3	2	5M

		ii) What is the nature of the singularity at z = 0 of the function $f(z)=\frac{\sin z - z}{z^3}$	3	2	5M
4		Unit-III			
	a	i) If $P(X=x)=\begin{cases} kx, & x=1,2,3,4,5 \\ 0, & otherwise \end{cases}$, represents a probability mass function (a) Find the value of k; (b) Find P(x being a prime number); (c) Find p (x>1)	3	3	5M
		ii) In a photographic process, the developing time of prints may be looked upon a random variable having the normal distribution with a mean of 16.28 seconds and a standard deviation of 0.12 seconds. Find the probability that it will take less than 16.35 seconds to develop the prints.	3	3	5M
		OR			
	b	i) A continuous random variable X has a density function given by f(x) = k(1 + x); 2 < x < 5. Find P(x < 4).	3	3	5M
		ii) If X is a binomially distributed random variable with E(x) = 2 and var(X) = 4/3. Find P(X = 5).	3	3	5M
5		Unit-IV			
	a	i) The Determine the 95% confidence interval for the average number of hours studied per week by the group of the 50 students given a mean of the 20 hours and a standard deviation of the 4 hours.	3	4	5M
		ii) A population has a mean of 80 and a standard deviation of 7. A sample of 49 observations will be taken. Find the probability that the mean from that sample will be larger than 82.	3	4	5M
		OR			
	b	i) A random sample of size 100 has a standard deviation 5. What can you say about maximum error with 95% confidence.	3	4	5M
		ii) A random sample of ten scores obtained by the students in a Math test are as follows: 2, 16, 3, 10, 11, 4, 6, 7, 9, 12. What will be the 90% confidence limits for the mean of the whole sample?	3	4	5M
6		Unit-V			
	a	From experience, it was recorded that certain workers who underwent a training merged out as the 1st, 2nd, 3rd, 4th grade workers and their number were in the ratio 9 : 3 : 3 : 1. In a current set of 556 such workers the respective graded persons were 315, 101, 108, 32. Use χ^2 test to find whether the observed values are commensurable to the recorded values.	3	5	10M
		OR			
	b	i) The heights of 10 adult males selected at random from a given locality had a mean 158 cms and variance 39.0625 cms. Test at 5% significance level the hypothesis that the adult males of the given locality are on the average less than 162.5 cms tall. Given for 9 degrees of freedom P(t > 1.83) = 0.05.	3	5	5M
		ii) A quality control engineer suspects that the proportion of defective units among certain manufactured items has increased from the set limit of 0.01. To test his claim, he randomly selected 100 of these items and found that the proportion of defective units in the sample was 0.02. Test the engineer's hypothesis at the 0.05 level of significance.	3	5	5M

NEC NARASARAOPETA ENGINEERING COLLEGE
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II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23ME2203 **MANUFACTURING PROCESSES**

Time: 3 hours (ME) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	List the materials used for pattern.	1	1	2M
	b	What are the advantages of blind riser over conventional type riser?	1	1	2M
	c	List the advantages of AC equipment over DC equipment in arc Welding.	1	2	2M
	d	Examine the causes of welding defects.	1	2	2M
	e	Differentiate between extrusion and drawing processes	1	3	2M
	f	Identify various defects in rolled parts	1	3	2M
	g	Define spring back	1	4	2M
	h	What are the advantages of Rubber Pad Forming process?	1	4	2M
	i	What is the need for additive manufacturing?	1	5	2M
	j	Why post processing is required in powder-based AM processes?	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Discuss the various positive and negative allowances provided to the patterns.	2	1	5M
		ii) Discuss briefly the match plate pattern with the help of suitable sketch.	2	1	5M
		OR			
	b	i) Describe the permanent mold casting process and discuss how it differs from the other casting processes.	2	1	5M
		ii) With the help of a neat diagram describe the process of true centrifugal casting.	2	1	5M
3		Unit-II			
	a	i) Describe submerged arc welding process with neat diagram.	2	2	5M
		ii) Analyze various types of oxy-acetylene flames with sketches.	2	2	5M
		OR			
	b	i) Evaluate the principle and application of Friction stir welding.	2	2	5M
		ii) Explain the advantages, disadvantages, and limitations of Resistance welding process.	2	2	5M

4		Unit-III			
	a	i) What are the specific advantages, limitations, and applications of cold working?	2	3	5M
		ii) Describe with neat sketches the process of hot extrusion of tubes.	2	3	5M
		OR			
	b	i) Describe press forging. How does it differ from drop forging?	2	3	5M
		ii) Describe clearly about various drawing processes.	2	3	5M
5		Unit-IV			
	a	i) Explain various sheet metal drawing operations with sketches.	2	4	5M
		ii) Explain the formability of sheet metals and formability test methods.	2	4	5M
		OR			
	b	i) Explain principle of electro magnetic forming?	2	4	5M
		ii) What is an explosive forming? Explain with sketches.	2	4	5M
6		Unit-V			
	a	i) Based on the state of input material/raw material classify the AM processes.	2	5	5M
		ii) Summarize the general steps for an Additive Manufacturing process.	2	5	5M
		OR			
	b	Explain about Vat Photo Polymerization Process and its working principle. Also, summarize the benefits and limitations of the process.	2	5	10M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23ME2204 FLUID MECHANICS & HYDRAULIC MACHINES

Time: 3 hours (ME) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Pascal's Law.	K2	1	2M
	b	Define specific gravity. What are its units.	K2	1	2M
	c	What is Reynolds Number. What is its significance.	K2	2	2M
	d	Define Bernoulli's Law. List out its applications.	K2	2	2M
	e	What is meant by Boundary Layer separation.	K2	3	2M
	f	Define Buckingham $\prod$ Theorem.	K2	3	2M
	g	Define Degree of Reaction. What is its importance.	K2	4	2M
	h	What is the function of draft tube.	K2	4	2M
	i	Explain the applications of Reciprocating pump.	K2	5	2M
	j	Define specific speed of a pump.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) State and Explain Newton's law of viscosity. Also briefly explain different types of fluids.	K2	1	5M
		ii) U- tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure is 750 mm of Hg.	K3	1	5M
		OR			
	b	i) Define Metacentric height. List the Equilibrium conditions for a floating body.	K2	1	5M
		ii) A block of wood of specific gravity 0.7 floats in water. Determine the metacentric height of the block if its size is 2 m × 1 m × 0.8 m.	K3	1	5M
3		Unit-II			
	a	i) State and Prove Bernoulli's equation from Euler's equation of motion. Also state its assumptions.	K3	2	5M
		ii) A pipe 300m has a slope of 1 in 100 and tapers from 1m diameter at the higher end to 0.5 m at the lower end. The quantity of water flowing is 900Ltrs/sec. If the pressure at the higher end is 70kPa, find the pressure at lower end.	K3	2	5M

		OR			
	b	i) What are the applications of Momentum equation. Explain.	K2	2	5M
		ii) Explain various losses in pipes. State and explain Reynold's experiment.	K2	2	5M
4		Unit-III			
	a	i) Explain with neat sketch boundary layer formation over a flat horizontal plate.	K3	3	5M
		ii) Explain about momentum and energy thickness in boundary layer.	K3	3	5M
		OR			
	b	i) What are repeating variables. How are these selected by dimensional analysis.	K2	3	5M
		ii) Explain Rayleigh method of the dimensional analysis.	K3	3	5M
5		Unit-IV			
	a	i) Derive the expression for force exerted by a jet on stationary curved plate if jet strikes the curved plate at the Centre and at one end.	K3	4	5M
		ii) A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45° to the axis of the jet. Calculate the normal pressure on the plate when the plate is stationary	K3	4	5M
		OR			
	b	Differentiate between Impulse and Reaction Turbine in detail.	K2	4	10M
6		Unit-V			
	a	i) Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water.	K3	5	5M
		ii) A Centrifugal pump delivers water against a net head of 10 m at a design speed of 800 rpm. The vanes are curved backwards and make an angle of 30° with the tangent at the outer periphery. The impeller diameter is 30cm and has a width of 5 cm at the outlet. Determine the discharge of the pump if the manometric efficiency is 85%.	K3	5	5M
		OR			
	b	i) Define priming. Why priming is necessary in centrifugal pump.	K2	5	5M
		ii) Enumerate the salient points of difference between the centrifugal and reciprocating pumps.	K2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23ME2205 **THEORY OF MACHINES**

Time: 3 hours (ME) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Distinguish between Mechanism and Machine with examples.	K2	1	2M
	b	Discuss about Grashof's law.	K2	1	2M
	c	What Coriolis components of acceleration? In what cases it occurs. How is it determined?	K2	2	2M
	d	Discuss the three types of instantaneous centers for a mechanism	K2	2	2M
	e	List out any two applications of gyroscopic principle.	K2	3	2M
	f	Discuss why there is need for balancing of masses.	K2	3	2M
	g	Explain the different motions that a follower can have.	K2	4	2M
	h	What do you mean by a gear train? Mention the different types of gear trains		4	2M
	i	Compare with neat sketches of the longitudinal, transverse and torsional free vibrations.	K2	5	2M
	j	Explain the uses of turning moment diagram of reciprocating engines	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain with neat sketches the various inversions of Four bar Chain Mechanism.	K3	1	5M
		ii) What are straight line mechanisms? Explain about Exact straight motion mechanisms made up of turning pairs?	K4	1	5M
		OR			
	b	i) Explain Whitworth quick return mechanism with a neat sketch.	K3	1	5M
		ii) Explain the different inversions of the slider crank chain.	K3	1	5M
3		Unit-II			
	a	The crank and connecting rod of a horizontal steam engine are 0.5 m and 2 m long respectively. The crank makes 180 r.p.m in the clockwise direction. When it has turned 45° from the inner dead center position, determine: (i) Velocity of piston (ii) Angular velocity of connecting rod (iii) Velocity of point E on the connecting rod 1.5 m from the gudgeon pin (iv) Velocity of rubbing at the pins of the crank shaft, crank and crosshead when the diameters of their pins are 5 cm, 3 cm, 6 cm respectively.	K5	2	10M
		OR			
	b	In a four-bar mechanism ABCD, points A and C are fixed points 30 cm apart and AB, CD are 60 cm and 70 cm long respectively, which are			10M

		connected by a rod BD which is 50 cm long. If AB rotates with uniform speed of 60 r.p.m, determine the velocity of D when AB is perpendicular to AC and when it makes 10^o on either side of the perpendicular.	K5	2	
4		Unit-III			
	a	A ship has a propeller of mass moment of inertia 2000 kg m^2. The propeller rotates at a speed of 360 rpm in clockwise sense looking from stern. Determine, (i) Gyroscopic couple and its effect when ship moves at 30 km/hr. and steers to the left at a radius of 200 m. (ii) max gyroscope couple and its effect when ship pitches and moving up having amplitude 10^o and time period 20 seconds. The motion occurs with SHM.	K5	3	10M
		OR			
	b	Four masses 200 kg, 300 kg, 240 kg and 260 kg are attached to a shaft. These masses are revolving at radii 270 mm, 210 mm, 300 mm and 360 mm respectively in planes measured from A_1 at 270 mm, 420 mm and 720 mm respectively. The angles measured anticlockwise are m_1 to m_2 45^o, m_2 and m_3 75^o, m_3 to m_4 135^o and the distance between the planes L and M in which the balance masses are to be placed is 500 mm. The distance between planes A_1 and L is 120 mm and M and A_4 is 100 mm. If the balancing masses revolve at a radius of 72 mm, find their magnitude and angular positions.	K5	3	10M
5		Unit-IV			
	a	Analyze the knife edge follower motion and also draw diagrams of displacement, velocity and acceleration in SHM.	K5	4	10M
		OR			
	b	i)Explain the terms Pressure angle, addendum and pitch. Write the differences between cycloidal, involute tooth forms	K3	4	8M
		ii) Explain Law of gearing	K3	4	2M
6		Unit-V			
	a	i) A simply supported shaft of length 800 mm carries a mass of 60 kg placed 250 mm from one end. If E=200 GN/m^2 and diameter of shaft is 50 mm, then find the natural frequency of transverse vibrations.	K5	5	5M
		ii) Interpret the following terms i) Logarithmic decrement ii) dynamic magnifier	K2	5	5M
		OR			
	b	i) Draw the turning moment diagram of a multi-cylinder engine.	K2	5	5M
		ii) The maximum and minimum speed of a flywheel are 242 rpm and 238 rpm respectively. The mass of flywheel is 2600 kg and radius of gyration is 1.8 m. Find (i) mean speed of flywheel, (ii) maximum fluctuation of energy and (iii) co-efficient of fluctuation of speed.	K5	5	5M

KL: Blooms Taxonomy Knowledge Level , CO: Course Outcome M: Marks

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EC2202 LINEAR CONTROL SYSTEMS (ECE) Max. Marks: 70

Time: 3 hours

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	State Mason's Gain Formula.	K2	1	2M
	b	What is a signal flow graph?	K1	1	2M
	c	Define a standard test signal.	K2	2	2M
	d	What is the time constant of a first-order system?	K1	2	2M
	e	What is meant by conditional stability?	K1	3	2M
	f	Define the root locus of a system.	K2	3	2M
	g	What is the Nyquist stability criterion?	K1	4	2M
	h	Differentiate between lag and lead compensators.	K2	4	2M
	i	Define the state transition matrix (STM).	K2	5	2M
	j	What is phase variable form in state space modeling?	K1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
		Unit-I			
2	a	i) Differentiate between open-loop and closed-loop control systems with examples.	K3	1	5M
		ii) For a given mechanical translational system with a mass M=2 kg, damping coefficient B=3 Ns/m, and spring constant K=5 N/m, write the differential equation and determine the transfer function X(s)/F(s).	K3	1	5M
		OR			
	b	i) Explain with example how a differential equation is formed from a physical system.	K2	1	5M
		ii) Write the mathematical model (differential equations and transfer function) for a DC motor armature control system.	K2	1	5M
		Unit-II			
3	a	i) Derive the time response of a second-order under damped system to a unit step input.	K3	2	5M
		ii) A first-order system has the transfer function 1/s+3. Find the time response to a unit step input.	K3	2	5M

		OR			
	b	i) What is steady-state error? Derive expressions for steady-state errors for type 0, type 1, and type 2 systems.	K2	2	5M
		ii) For the system with unity feedback and open-loop transfer function $G(s)=10/s(s+2)$. Determine the position, velocity, and acceleration error constants.	K3	2	5M
		Unit-III			
4	a	i) State and explain the Routh-Hurwitz stability criterion with an example of a 4th order system.	K3	3	5M
		ii) Determine the stability of the system with the characteristic equation: $s^4+2s^3+3s^2+4s+5=0$.	K3	3	5M
		OR			
	b	i) Explain the steps involved in constructing the root locus for a given system.	K2	3	5M
		ii) The characteristic equation of a system is: $s^4+2s^3+10s^2+20s+16=0$. Construct the Routh array and determine the stability.	K3	3	5M
		Unit-IV			
5	a	i) Explain the correlation between time response and frequency response of a second-order system.	K2	4	5M
		ii) Construct a Bode plot and calculate the gain and phase margins for the transfer function: $G(s)=100/s(s+10)$.	K3	4	5M
		OR			
	b	i) State and explain the Nyquist stability criterion.	K3	4	5M
		ii) Describe how lag and lead compensators can improve the performance of a control system.	K3	4	5M
		Unit-V			
6	a	i) Explain the basic concepts of state, state variables, and state space with suitable examples.	K2	5	5M
		ii) Convert the following transfer function into state-space form using the controllable canonical form: $\frac{Y(s)}{U(s)}=\frac{5}{s^2+3s+2}$	K3	5	5M
		OR			
	b	i) Explain diagonalization of a matrix and its importance in state-space analysis.	K2	5	5M
		ii) Determine the diagonal form of the following system matrix using similarity transformation: $A=\begin{bmatrix}4 & 1\\ 0 & 4\end{bmatrix}$	K3	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EC2203

ELECTROMAGNETIC WAVES & TRANSMISSION LINES

Time: 3 hours (ECE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Explain the Magnetic Flux Density	2	1	2M
	b	Derive the expression for Poisson's and Laplace's equations.	3	1	2M
	c	What is Faraday's law of electromagnetic induction?	1	2	2M
	d	Compare the boundary conditions of magnetic field with those of electric field.	4	2	2M
	e	Write about the wave propagation in a Lossless Media.	5	3	2M
	f	Explain about the characteristics of uniform plane waves	2	3	2M
	g	Define primary constants & secondary constants?	1	4	2M
	h	Write in brief about the different types of transmission lines.	2	4	2M
	i	What is meant by stub? Explain its use in transmission lines.	4	5	2M
	j	Discuss in brief reflection coefficient of a transmission line	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) State Ampere's circuit law. What are its applications?	2	1	5M
		ii) Derive expression for magnetic field at any point on the axis at a distance 'h' from the centre of a circular loop of radius 'a' and carrying current 'I'	1	1	5M
		OR			
	b	i) Derive expression for electric field due to an infinite line charge	3	1	5M
		ii) State and explain Biot Savart's law. Give expressions of Biot Savart's law.	1	1	5M
3		Unit-II			
	a	i) Write down the integral and differential forms of Maxwell's equations and write their physical significance	3	2	5M
		ii) Discuss the boundary conditions at the interface separating one dielectric and another.	1	2	5M

		OR			
	b	i) Write Maxwell's equations for electrostatic fields	2	2	5M
		ii) Prove that $\nabla \times H = j\omega D + J$	3	2	5M
4		Unit-III			
	a	i) Derive the relation between E and H in uniform plane wave propagation	1	3	5M
		ii) Derive the expression for attenuation and phase constants of uniform plane wave.	4	3	5M
		OR			
	b	i) Define Brewster angle? Explain	5	3	5M
		ii) Define uniform plane wave and derive the general solution of uniform plane wave equation	4	3	5M
5		Unit-IV			
	a	i) Define the term characteristic impedance and derive the expression for it	2	4	5M
		ii) A Transmission line in which no distortion is present has the following parameters : Z0 =50 Ω, α=0.020 m -1 , v=0.6 v0 . Determine R, L, G, C and Wavelength at 0.1 GHz.	1	4	5M
		OR			
	b	i) What are the major losses that occur in transmission lines? How is a loss-less line characterized?	3	4	5M
		ii) A high frequency line has the following primary constants L=1.2 mH/ Km, C=0.05μF/Km.R = G = negligible. Determine the characteristics impedance and propagation constant of the line.	1	4	5M
6		Unit-V			
	a	i) Define the reflection coefficient and derive the expression for the input impedance in terms of reflection coefficient.	2	5	10M
		OR			
	b	i) Discuss the configuration of the SC & OC lines	4	5	5M
		ii) Define Reflection coefficient and VSWR. Explain the relation between the two quantities in terms of their definition	5	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

R23

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EC2204 **ELECTRONIC CIRCUIT ANALYSIS**

Time: 3 hours (ECE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is Miller's theorem?	K1	1	2M
	b	What are the different h-parameters of a transistor?	K2	1	2M
	c	Give the advantages of negative feedback.	K2	2	2M
	d	Define the term stability.	K2	2	2M
	e	What do you mean by positive feedback?	K2	3	2M
	f	Draw the block diagram of a feedback amplifier.	K2	3	2M
	g	What are the merits and demerits of Hartley oscillators?	K1	4	2M
	h	What are the fundamental requirements for an electronic oscillator design?	K2	4	2M
	i	How do we classify power amplifiers?	K1	5	2M
	j	How do we increase the bandwidth of a tuned amplifier?	K3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Obtain the expressions of the high-frequency short-circuit gain of a BJT in CB mode.	K4	1	5M
		ii) Show that at high frequency, the ratio of input current and input voltage of a CE mode BJT amplifier becomes a complex number, and the value of the imaginary part is dependent on the gain of the amplifier.	K3	1	5M
		OR			
	b	i) Define the terms: a) mid-frequency gain, b) lower cut-off frequency, c) upper cut-off frequency, d) Figure of merit of a single-stage RC coupled CE mode BJT amplifier. Derive relation connecting them.	K2	1	10M
3		Unit-II			
	a	i) Draw a Darlington emitter follower. Explain why the input impedance is higher than that of a single-stage emitter follower.	K2	2	5M
		ii) Write a short note on: Boot-strap emitter follower.	K1	2	5M
		OR			
	b	i) Write a short note on: Darlington amplifier.	K1	2	5M

		ii) A negative feedback amplifier in voltage series configuration feeds 10% of the output back to the input. The voltage gain of the amplifier without feedback is 100. Input and output resistances are 10 kΩ and 1 kΩ, respectively. Find the percentage reduction in voltage gain, input resistance, and output resistance with feedback.	K3	2	5M
4		Unit-III			
	a	i) What are the different topologies of negative feedback? What are their effects on input and output resistances of the amplifiers?	K2	3	5M
		ii) Obtain the expression of gain in terms of open-loop gain and feedback factor for a feedback amplifier.	K3	3	5M
		OR			
	b	i) Show that the gain bandwidth products of an amplifier with and without negative feedback are equal.	K4	3	5M
		ii) With the proper circuit diagram, derive the expression of gain of a collector feedback BJT amplifier.	K3	3	5M
5		Unit-IV			
	a	i) Explain how a positive feedback amplifier can generate oscillations. What do you mean by the Barkhausen criterion?	K2	4	5M
		ii) Derive the expression for the frequency of a Colpitts-type voltage-controlled oscillator in terms of the controlled voltage.	K3	4	5M
		OR			
	b	i) Qualitatively explain that the device's non-linearity is required for building up and amplitude stabilization in an oscillator.	K3	4	5M
		ii) Find the condition of oscillation and frequency of oscillation of an RC phase shift oscillator.	K4	4	5M
6		Unit-V			
	a	i) With a neat circuit diagram, analyse the response of a push-pull class B power amplifier.	K2	5	5M
		ii) Derive the expression of efficiency and power loss for a push-pull class B power amplifier.	K4	5	5M
		OR			
	b	i) How can a load be connected to a tuned circuit with minimum reduction of Q-factor? Explain your answer.	K4	5	5M
		ii) Show that a double-tuned amplifier can have about three times the 3dB bandwidth compared to that of a single-tuned amplifier.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks***

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23EC2205 **ANALOG COMMUNICATIONS**

Time: 3 hours (ECE) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define modulation. Why is modulation required?	2	1	2M
	b	Define modulation index and mention the range of modulation index?	3	1	2M
	c	What are the Advantages of SSB systems?	4	2	2M
	d	Write the expression for SSB and VSB Waves	5	2	2M
	e	What are Advantages & Applications of FM?	4	3	2M
	f	Define frequency deviation? What is wideband FM and Narrowband FM?	1	3	2M
	g	List the Classification of receivers.	2	4	2M
	h	Define Image frequency and Image frequency rejection ratio	4	4	2M
	i	Draw the single and double polarity PAM waves	2	5	2M
	j	Define White noise and Shot noise	3	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Define a standard form of amplitude modulation and explain the time and frequency domain expression of an AM wave.	3	1	5M
		ii) Explain with the help of a neat sketch, how a square law modulator is used to generate an AM	2	1	5M
		OR			
	b	i) Draw the diagram and explain working of FDM system	4	1	5M
		ii) Explain the working of an envelope detector	4	1	5M
3		Unit-II			
	a	i) Explain the phase discrimination method for generating SSB.	2	2	5M
		ii) With a neat diagram explain the balanced modulator method of generating DSBSC	2	2	5M
		OR			
	b	i) Discuss the process of generation of VSB waves	3	2	5M
		ii) Explain the phase discrimination method for generating SSB.	4	2	5M
4		Unit-III			
	a	i) Explain clearly about pre-emphasis and de-emphasis in FM wave.	2	3	5M
		ii) Explain different modes in a phase locked loop	4	3	5M

		OR			
	b	i) With a neat block diagram explain the Armstrong method of FM generation.	1	3	5M
		ii) Compare narrow band and wide band FM	2	3	5M
5		Unit-IV			
	a	i) Discuss the Effects of feedback on the performance of AM Transmitter	3	4	5M
		ii) List out the advantages and disadvantages of TRF receiver.	4	4	5M
		OR			
	b	i) Draw the AM Superhetrodyne receiver and explain the importance of each functional unit	5	4	5M
		ii)write short notes on Communication Receivers?	4	4	5M
6		Unit-V			
	a	i) Derive the expression for the figure of merit of DSBSC receiver that uses coherent detection.	3	5	5M
		ii) Write short notes on amplitude limiting.	2	5	5M
		OR			
	b	i) With neat sketch explain the generation of PPM from PWM.	1	5	5M
		ii) Compare PAM,PPM and PWM.	4	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23DS2201 STATISTICAL METHODS FOR DATA SCIENCE

Time: 3 hours (DS) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define a probability distribution.	1	1	2M
	b	What type of data is best visualized using a line chart? Give an example.	2	1	2M
	c	What is parametric estimation?	1	2	2M
	d	Differentiate between a paired t-test and an independent t-test.	3	2	2M
	e	Discuss about Exponential Regression.	2	3	2M
	f	List two assumptions made in multiple linear regression.	1	3	2M
	g	Briefly describe the main components of a Time Series.	2	4	2M
	h	Discuss the Logarithmic Method of trend analysis.	2	4	2M
	i	Outline the steps involved in building a classification model using logistic regression.	2	5	2M
	j	Can logistic regression be used for multiclass classification? Briefly explain.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
		Unit-I			
2	a	i) Describe the key features of a **bubble plot**. How is it different from a scatter plot?	2	1	5M
		ii) A factory produces light bulbs with a 90% success rate (i.e., the probability that a bulb is not defective is 0.9). If a quality inspector randomly selects 10 bulbs. **(a)** What is the probability that exactly 8 of them are not defective? **(b)** What is the expected number of non-defective bulbs in the sample?	2	1	5M
		OR			
	b	i) A call center receives an average of 6 calls per hour. **(a)** What is the probability that exactly 4 calls are received in a given hour? **(b)** What is the probability that no calls are received in a 30-minute interval?	2	1	5M
		ii) What is Exploratory Data Analysis (EDA) and why is it important?	2	1	5M
3		**Unit-II**			
	a	i) Explain the relationship between confidence intervals and hypothesis testing in the context of t-tests.	2	2	5M
		ii) You are given a sample mean of 80, a standard deviation of 10, and a sample size of 25. Construct a 95% confidence interval.	2	2	5M

		OR			
	b	i) Discuss the steps involved in conducting a hypothesis test.	2	2	5M
		ii) How do you choose between using a t-test and ANOVA when comparing more than two groups?	2	2	5M
4		Unit-III			
	a	i) Find X_3 on X_1 and X_2 using multiple regression	2	3	10M

X_1	3	5	6	8	12	14
X_2	16	10	7	4	3	2
X_3	90	72	54	42	30	12

		OR			
	b	i) Differentiate between Linear Regression and Curvilinear Regression.	3	3	5M
		ii) Describe the methods used for variable selection in multiple regression analysis	2	3	5M
5		Unit-IV			
	a	i) Fit a trend line to the following data by the method of semi-averages	2	4	10M

Year	Sales	Year	sales
2005	102	2009	108
2006	105	2010	116
2007	114	2011	112
2008	110		

		OR			
	b	i) Differentiate between straight-line trends and exponential trends in time series.	3	4	5M
		ii) Explain the Link Relative Method used in seasonal variation analysis.	2	4	5M
6		Unit-V			
	a	i) Describe the setup of a logistic regression model.	2	5	5M
		ii) Explain how logistic regression is used for solving classification problems.	2	5	5M
		OR			
	b	i) Compare the performance of different logistic regression models.	3	5	5M
		ii) How do you interpret the coefficients in a logistic regression model?	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

R23

Sub Code: R23DS2202 **DATA ENGINEERING**

Time: 3 hours (DS) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define Data Engineering and how it is different from Data Science?	L4	1	2M
	b	What are the essential skills required by a Data Engineer?	L1	1	2M
	c	What are the key considerations for evaluating ingestion patterns?	L2	2	2M
	d	Suggest possible ways to address the *serving data challenges* connected to *Data Quality.*	L2	2	2M
	e	Expand CRUD in Data Engineering and why are CRUD operations important in Data Engineering?	L	3	2M
	f	Distinguish between Enterprise Architecture and Data Architecture.	L4	3	2M
	g	What are the raw ingredients of Data Storage in Data Engineering?	L1	4	2M
	h	Write the differences between Data Lake and Data Warehouse in terms of Data format and purpose.	L4	4	2M
	i	What is reverse ETL and why it is beneficial in serving data?	L2	5	2M
	j	Write the difference among Conceptual, Logical and Physical Models.	L4	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Write brief note on the essential skills required to become Data Engineer and Data Scientist.	L1	1	5M
		ii) Justify the following statement: "Data Maturity is important to ensure improved data quality and for better decision making".	L5	1	5M
		OR			
	b	i) Write short note the various phases of Data Engineering Life Cycle.	L1	1	5M
		ii) Define Data Maturity Model and what are the advantages of using a Data Maturity model?	L2	1	5M
3		Unit-II			
	a	i) What are the major undercurrents across the Data Engineering Life Cycle.	L1	2	5M
		ii) What is Data Orchestration and why it is important for better data quality and enhanced data collaboration?	L2	2	5M
		OR			
	b	i) What is Data Architecture and mention the roles of Data Engineer in implementing Data Architecture.	L1	2	5M
		ii) Distinguish between Data Life Cycle and Data Engineering Life Cycle.	L4	2	5M

4		Unit-III			
	a	i) What are the key challenges in Data generation? Discuss in brief.	L1, L6	3	5M
		ii) Briefly explain the Principles of Good Data Architecture.	L1	3	5M
		OR			
	b	i) Describe various ways of generation in source systems.	L2	3	5M
		ii) What is Change Data Capture(CDC) and how does log based CDC works?	L2	3	5M
5		Unit-IV			
	a	i) What are the levels of Storage Abstractions in Data Engineering? Briefly explain.	L1	4	5M
		ii) What is Data Ingestion and write short note on Message and Stream Ingestion.	L1	4	5M
		OR			
	b	i) What is Batch Ingestion? Briefly explain how does it works? And also write the variation between Batch Ingestion and Micro-Batch Ingestion.	L2, L3	4	5M
		ii) Briefly discuss the benefits of Abstraction in Data Engineering by keeping the present day applications in view.	L2	4	5M
6		Unit-V			
	a	i) "Scalability and performance are crucial considerations for data serving systems" – Justify this statement with suitable justification.	L5	5	5M
		ii) Describe the process of improving the performance of queries on streaming data.	L2	5	5M
		OR			
	b	i) What is Query Optimizer and how does it works?	L2	5	5M
		ii)Briefly discuss about various ways to serve data for Analytics.	L4	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025 **R23**

Sub Code: R23DS2203 COMPUTER ORGANIZATION & ARCHITECTURE

Time: 3 hours (DS) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Convert $(125)_{10}$ to binary and octal.	3	1	2M
	b	Convert $(ECE)_{16}$ to binary and decimal.	3	1	2M
	c	What is a latch and a flip-flop?	1	2	2M
	d	Explain 2X4 decoder.	2	2	2M
	e	What is an interrupt?	1	3	2M
	f	What are the phases of Instruction Cycle?	1	3	2M
	g	Explain about conditional flags.	2	4	2M
	h	Illustrate the Instruction Format.	2	4	2M
	i	What is Input-Output Interface?	1	5	2M
	j	Differentiate ROM and RAM.	2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Explain about Error detection and correction codes.	2	1	5M
		ii) Realize a 2 input EX-OR gate using minimum number of 2 input NAND gates.	3	1	5M
		OR			
	b	i) Explain different methods used to represent negative numbers in binary system.	2	1	5M
		ii) Using the k-map method express the function in standard SOP form. F=AB+ AC +C+ AD+AB'C+ ABC	3	1	5M
3		Unit-II			
	a	i) Draw the logic diagram of a 4-to-1 line multiplexer with logic gates	2	2	10M
		OR			
	b	i) Explain 4-bit shift register using D flip-flops & it's working with the help of timing diagrams.	2	2	5M
		ii) What is a combinational logic circuit? Implement a Full adder using two half adders and one OR gate.	3	2	5M
4		Unit-III			
	a	Discuss in detail booth multiplication algorithm with example.	3	3	10M

		OR			
	b	i) Perform floating point addition using the numbers 0.3 and 0.2675 use the floating point addition algorithm.	3	3	5M
		ii) Explain briefly about arithmetic, logical and shift instructions.	2	3	5M
5		Unit-IV			
	a	i) What is the role of control unit? Give an example of micro program.	2	4	5M
		ii) Illustrate on data manipulation instructions.	2	4	5M
		OR			
	b	i) What is control memory? Explain the address sequencing mechanism.	2	4	5M
		ii) Explain various addressing modes with examples.	2	4	5M
6		Unit-V			
	a	i) Demonstrate how data is transmitted between main memory and secondary memory using DMA?	2	5	7M
		ii) Explain cache memory and write its importance. Relate it with auxiliary memory.	2	5	3M
		OR			
	b	i) Differentiate synchronous and asynchronous data transfer modes.	2	5	5M
		ii) Explain briefly about memory hierarchy and discuss size and performance parameters.	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

R23

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23CY2202 **NUMBER THEORY & APPLICATIONS**

Time: 3 hours (CYBER SECURITY) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	Define the Euclidean Algorithm for computing the greatest common divisor.	K1	1	2M
	b	Explain the fundamental theorem of arithmetic with an example.	K2	1	2M
	c	State the definition of congruence modulo n.	K1	2	2M
	d	Explain with an example what is meant by a linear congruence.	K2	2	2M
	e	State Fermat's Little Theorem.	K1	3	2M
	f	Describe the purpose of Euler's phi-function in number theory.	K2	3	2M
	g	Define a finite field with an example.	K1	4	2M
	h	Briefly explain Fermat's factorization method.	K2	4	2M
	i	What is meant by a public-key cryptographic system?	K1	5	2M
	j	Explain the purpose of the RSA algorithm in secure communication.	K2	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No		Questions	KL	CO	M
2		Unit-I			
	a	i) Use the Euclidean Algorithm to find the GCD of 462 and 1071.	K3	1	5M
		ii) Show how any integer can be uniquely represented as a product of prime numbers.	K3	1	5M
		OR			
	b	i) Find the factors of the numbers 6077 and 7709 by using Fermat factorization technique.	K3	1	5M
		ii) Solve the linear Diophantine equation: $172x + 20y = 100$ and interpret the result.	K3	1	5M
3		Unit-II			
	a	i) Compare and contrast the solutions of $x \equiv 3 \pmod 4$ and $x \equiv 5 \pmod 6$.	K4	2	5M
		ii) Analyze the limitations of linear congruence equations.	K4	2	5M
		OR			
	b	i) State and prove Chinese Remainder theorem.	K2	2	5M
		ii) Solve the following system of linear congruence: $2x+5y+6z \equiv 3 (mod 7), 2x+z \equiv 4 (mod 7), x+2y+3z \equiv 1 (mod 7)$.	K3	2	5M

4		Unit-III			
	a	i) Explain the use of congruence in round-robin tournament scheduling.	K2	3	5M
		ii) Use Wilson's theorem to verify the primality of a given number.	K3	3	5M
		OR			
	b	i) Design a hashing function using mod arithmetic and explain its collision handling.	K3	3	5M
		ii) Discuss the relevance of congruence in perpetual calendar algorithms.	K2	3	5M
5		Unit-IV			
	a	i) Use the rho method to factor the number 8051.	K3	4	5M
		ii) Explain quadratic residues and their properties in a finite field.	K2	4	5M
		OR			
	b	i) Compare different factorization techniques based on efficiency.	K4	4	5M
		ii) Prove that there are infinitely many pseudo primes to the base 2.	K3	4	5M
6		Unit-V			
	a	i) Explain about Block-cipher.	K2	5	5M
		ii) By using Modular-Exponentiation, find $7^{256} \, mod \, 13$.	K3	5	5M
		OR			
	b	i) Differentiate between character ciphers and block ciphers with examples.	K4	5	5M
		ii) Demonstrate RSA algorithm.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

II B.Tech II Semester Regular Examinations, May-2025

Sub Code: R23CY2205 **COMPUTER NETWORKS**

Time: 3 hours (CYBER SECURITY) Max. Marks: 70

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answering all the questions from Part-A is compulsory (10 x 2M = 20M)

Q.No		Questions	KL	CO	M
1	a	What is LAN?	1	1	2M
	b	Distinguish between wired networks and wireless networks.	1	1	2M
	c	What is *WWW*?	1	2	2M
	d	What is Dynamic Web Page?	1	2	2M
	e	Give brief note on Berkeley Sockets.	1	3	2M
	f	Distinguish between TCP and UDP protocols.	1	3	2M
	g	Comparison between *Virtual-Circuits* And *Datagram Networks.*	1	4	2M
	h	What are the Heterogeneous Networks?	1	4	2M
	i	State two error detection codes.	1	5	2M
	j	*What is CSMA/CD?*	1	5	2M

PART-B

Answer either 'a' or 'b' from each question of **PART-B** (5 x 10M = 50M)

Q.No			Questions	KL	CO	M
2			Unit-I			
	a		i) Explain different types of Computer Networks.	2	1	5M
			ii) Draw and Explain OSI reference model	2	1	5M
			OR			
	b		i) Draw and Explain TCP/IP protocol stack	2	1	5M
			ii) What are the service primitives? How these can be used in data communication among the network layers.	2	1	5M
3			Unit-II			
	a	i)	Outline the major phases in the evolution of the internet.	2	2	10M
			OR			
	b	i)	Explain the functioning of World Wide Web Applications	2	2	10M
4			Unit-III			
	a	i)	Explain the functioning of TCP protocol.	2	3	5M
		ii)	What is the advantages TCP protocol in message delivery?	2	3	5M
			OR			
	b	i)	How TCP handles congestion control in network?	2	3	5M
		ii)	Discuss TCP Connection Establishment procedure.	2	3	5M
5			Unit-IV			
	a	i)	Illustrate working Shortest Path Algorithm.	2	4	5M
		ii)	Distinguish between Broadcast *Routing* and *Multicast Routing.*	2	4	5M

		OR			
	b	i) Explain Internetwork Routing:and Routing Across Multiple Networks.	2	4	5M
		ii) Distinguish between IPV4 Vs IPV6	2	4	5M
6		Unit-V			
	a	i) Discuss design issues in Data Link Layer.	2	5	5M
		ii) What are the error detection codes? Discus any two error detection codes.	2	5	5M
		OR			
	b	i) Illustrate Carrier Sense Multiple Access Protocols with example.	2	5	5M
		ii) Explain The Channel Allocation Problem in wireless networks	2	5	5M

KL: Blooms Taxonomy Knowledge Level CO: Course Outcome M: Marks

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