

R23

II BTECH II SEM

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

NOVEMBER 2025

II B.Tech II Semester Supple. Examinations, November-2025

Sub Code: R23CC2201 **MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**

Time: 3 hours

(CE, CSE, ECE, EEE, CYS)

Max. Marks: 70

R23

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	Describe about the Law of Demand.	2	1	2M
	b	List any two types of Elasticity of Demand.	2	1	2M
	c	Outline the production function.	2	2	2M
	d	Distinguish between Iso-quants and Iso-cost.	2	2	2M
	e	Interpret the Sole Proprietorship.	2	3	2M
	f	Describe the Price Discrimination.	2	3	2M
	g	Define working capital and mention its major types.	2	4	2M
	h	State any two differences between short-term and long-term capital.	2	4	2M
	i	Define journal and explain its purpose.	2	5	2M
	j	Outline the liquidity ratios.	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) Describe the significance of Managerial Economics in decision-making.	2	1	5M
		ii) Define demand and explain the determinants of demand.	2	1	5M
	OR				
	b	i) Identify the major factors that influence demand forecasting.	3	1	5M
		ii) Describe the Elasticity of Demand. Explain its different types.	2	1	5M
3	Unit-II				
	a	i) Discuss the cost behavior in the short run.	2	2	5M
		ii) Find the number of units to be sold to earn the desired profit from the following information.	3	2	5M
		Selling price per unit = ₹250, Variable cost per unit = ₹150, Fixed cost = ₹50,000; Desired profit = ₹30,000.			
	OR				
	b	i) Explain the concept of least-cost combination of inputs using isoquant and Iso-Cost analysis.	2	2	5M
		ii) A company sells a product at ₹200 per unit. The fixed cost is ₹40,000 and variable cost is ₹120 per unit. Calculate the break-even point in units and value.	3	2	5M

4	Unit-III				
	a	i) Differentiate between Perfect and Imperfect Market structures.	22	3	5M
		ii) Explain the characteristics of Monopoly Market.		3	5M
	OR				
	b	i) Explain how price and output are determined under Perfect Competition.	2	3	5M
ii) Discuss the various methods of pricing used by firms.		2	3	5M	
5	Unit-IV				
	a	i) Explain any three sources of long-term capital.	2	4	5M
		ii) A project requires an initial investment of ₹50,000. It is expected to generate cash inflows of ₹15,000 per year for 5 years. The cost of capital is 10%. Calculate NPV.	4	4	5M
	OR				
	b	i) Discuss the important features of capital budgeting decisions.	2	4	5M
ii) A project costs ₹40,000 and is expected to generate ₹10,000 per year for 5 years. Find the IRR.		4	4	5M	
6	Unit-V				
	a	Journalize the following transactions in the books of Ravi for the year 2024. 1. Mr. Ravi started business with cash ₹1,00,000. 2. Purchased furniture for ₹10,000 in cash. 3. Bought goods worth ₹20,000 on credit from M/s Gupta Traders. 4. Sold goods for ₹15,000 in cash. 5. Paid ₹5,000 towards office rent. 6. Received ₹10,000 from a debtor, Mr. Arjun. 7. Paid ₹8,000 to M/s Gupta Traders in full settlement of ₹8,200. 8. Purchased a computer for office use for ₹25,000 through bank. 9. Paid salaries to employees ₹12,000. 10. Withdrew ₹3,000 cash from business for personal use.	4		10M
				5	
	OR				
	b	The following information is provided from the financial statements of XYZ Ltd. for the year ended 31st March 2024: Net Profit: ₹1,50,000. Net Sales: ₹10,00,000. Cost of Goods Sold (COGS): ₹7,00,000. Current Assets: ₹4,00,000. Current Liabilities: ₹2,00,000. Inventory: ₹1,50,000. Receivables: ₹1,00,000. Average Debtors: ₹1,20,000. Shareholders' Equity: ₹5,00,000. Long-Term Debt: ₹2,00,000. i) Calculate the Gross Profit Ratio. ii) Calculate the Current Ratio. iii) Calculate the Quick Ratio. iv) Calculate the Debtors Turnover Ratio. v) Calculate the Debt-Equity Ratio.	4		10M
			5		

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-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 Define Arithmetic mean of grouped data and ungrouped data.	K2	1	2M
	b Define Median of grouped data and ungrouped data.	K2	1	2M
	c Demonstrate coefficient of correlation.	K4	2	2M
	d Demonstrate the normal equations to fit a parabola.	K4	2	2M
	e Define probability with simple example.	K3	3	2M
	f Demonstrate Baye's theorem.	K3	3	2M
	g Samples of size 3 are taken from the population 1, 2, 3, 4, 5, 6. Find the mean of the population	K6	4	2M
	h A population consists of six numbers 4, 8, 12, 16, 20, 24. Find the population mean and variance.	K6	4	2M
	i Analyze type-1 and type-2 errors.	K4	5	2M
	j Among 900 people in a state 90 are found to be chapatti eaters. Construct 90% confidence interval for the true population.	K4	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) Calculate the median from the following data:										K2	1	5M	
		Marks	10-25	25-40	40-55	55-70	70-85	85-100							
		Frequency	6	20	44	26	3	1							
	b	ii) Calculate them mean deviation from median from the following data:										K2	1	5M	
Size of item		6	7	8	9	10	11	12							
Freq.		3	6	9	13	8	5	4							
OR															
	b	i) Calculate Karl Pearson's coefficient of skewness for the following data:										K1	1	5M	
		Variable	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40					
		Freq.	2	5	7	13	21	16	8	3					
Calculate Karl Pearson's coefficient of skewness for the following data										K2	1	5M			
25,15,23,40,27,25,23,25,20.															
3	Unit-II														
	a	Find the coefficient of correlation between the two variables.										K4	2	5M	
		x	50	50	55	60	65	65	65	60	60				60
		y	11	13	14	16	16	15	15	14	13				13

		ii) Obtain the rank correlation coefficient for the following data:										K4	2	5M		
		X	68	64	75	50	64	80	75	40	55	64				
		Y	62	58*	68	45	81	60	68	48	50	70				
		OR														
		In the following table S is weight of Potassium bromide which will dissolve in 100 grms. of water at $V^{\circ}C$. Identify an equation of the form $S = mT + b$ by the method of least squares. Use this relation to estimate S when $T = 50^{\circ}$.										K3	2	5M		
		T	0	20	40	60	80									
		S	54	65	75	85	96									
	b	ii) Identify a second degree polynomial to the following data by the method of least squares:										K4	2	5M		
		x	0	1	2	3	4									
		y	1	1.8	1.3	2.5	6.3									
		Unit-III														
4	a	i) A business man goes to hotels X, Y, Z 20%, 50% and 30% of the time respectively. It is known that 5%, 4% and 8% of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability that business men room having faulty plumbing is assigned to hotel Z.										K2	3	5M		
		ii) A, B and C in order toss a coin. The first one to toss a head wins the game. What are their probabilities of winning, assuming that the game may continue indefinitely?										K3	3	5M		
		OR														
		b	i) State and Prove Addition theorem on Probability with one example.										K2	3	5M	
		ii) If X is a continuous random variable and $y = ax + b$ then prove that $E(y) = a E(x) + b$ and $V(y) = a^2 v(x)$.										K3	3	5M		
		Unit-IV														
5	a	i) A research worker wishes to estimate mean of a population by using sufficiently large sample. The probability is 95% that sample mean will not differ from the true mean by more than 25% of the standard deviation. How large a sample should be taken?										K3	4	5M		
		ii) Prove that for a random variable of size n , $x_1, x_2, \dots, x_n$ taken from a finite population $s^2 = \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$ is not unbiased estimator of the parameter σ^2 but $\frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$ is unbiased										K2	4	5M		
		OR														
		b	i) The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can one assert that 95% confidence about the maximum error if $\bar{x} = 11,795$ and $n=50$.										K4	4	5M	
		ii) Explain Bayesian Estimation with diagrams.											4	5M		
		Unit-V														
6	a	i) A sample of 100 iron bars is said to be drawn from a large number of bars. Whose lengths are normally distributed with mean 4 feet and standard deviation 0.6 feet. If the sample mean is 4.2 feet can the sample be regarded as a truly random sample?										K2	5	5M		
		ii) In a random sample of 400 industrial accidents it was found that 1 were due to least partially to unsafe working conditions. Construct a 99% confidence interval for the corresponding true proportion using large sample confidence formula.										K2	5	5M		
		OR														
		b	i) If we can assert with 95% that the maximum error is 0.05 and p is given as 0.2. Find the size of the sample.										K3	5	5M	
		ii) A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 are defective. Test the hypothesis at 0.05 level.										K3	5	5M		

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

Sub Code: R23CC2203

OPERATING SYSTEMS

Time: 3 hours

(CSE, IT, 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	Name the types of Operating systems	K2	1	2M
	b	What are the types of System calls	K2	1	2M
	c	Define Process scheduling	K4	2	2M
	d	What do you mean by Multithreading	K4	2	2M
	e	What is Readers-writers problem	K4	3	2M
	f	Define Deadlock	K4	3	2M
	g	Define Demand paging	K4	4	2M
	h	Write any two differences between FIFO and LRU	K4	4	2M
	i	Define file system operations	K2	5	2M
	j	What do you mean by contiguous allocation	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 the key functions and services provided by an operating system	K2	1	10M
	OR				
3	b	i) Describe the types of system calls and give examples for each.	K2	1	10M
	Unit-II				
	a	i) Explain the lifecycle of a process using the process state diagram.	K4	2	5M
		ii) Describe any two classical synchronization problems.	K4	2	5M
	OR				
4	b	i) Compare preemptive and non-preemptive CPU scheduling with examples.	K4	2	5M
		ii) What is a race condition? How can it be avoided in concurrent execution?	K4	2	5M
	Unit-III				
	a	i) What are the four necessary conditions for deadlock to occur? Explain.	K4	3	5M
		ii) Explain the Banker's Algorithm for deadlock avoidance with an example	K4	3	5M
	OR				
5	b	i) Differentiate between deadlock prevention and deadlock detection.	K4	3	5M
		ii) Discuss the recovery techniques used after deadlock detection.	K4	3	5M
	Unit-IV				
	a	i) Compare fixed and dynamic partitioning schemes in contiguous memory allocation.	K4	4	5M
		ii) Explain the concept of paging and how it handles memory fragmentation	K4	4	5M

	OR				
	b	i) Describe the working of the Least Recently Used (LRU) page replacement algorithm.	K4	4	5M
		ii) What is thrashing and how can it be controlled in virtual memory systems?	K4	4	5M
6	Unit-V				
	a	i) Explain any two disk scheduling algorithms with suitable examples.	K2	5	5M
		ii) Describe the different types of directory structures used in file systems.	K2	5	5M
	OR				
	b	i) Compare contiguous, linked, and indexed file allocation methods.	K2	5	5M
		ii) What is file-system mounting? Why is it necessary?	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

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	Define the inheritance	1	1	2M
	b	What is entity	1	1	2M
	c	What is degree of a Relation?	1	2	2M
	d	What is DDL and list out the commands in DDL?	1	2	2M
	e	Define Sub query and give its types	1	3	2M
	f	List the types of joins	1	3	2M
	g	What is transitive dependency?	1	4	2M
	h	What is Lossless join property?	1	4	2M
	i	What are the different phases of transaction?	1	5	2M
	j	What is serializability?	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) Compare and contrast Hierarchical, Network, and Relational data models.	2	1	5M
		ii) Discuss Specialization and Generalization in ER modeling.	2	1	5M
	OR				
	b	i) Explain the Three-Tier Schema Architecture.	2	1	5M
		ii) Discuss key constraints in Ternary Relationships.	2	1	5M
3	Unit-II				
	a	i) Explain the role of null values in a relational database. What are the problems associated with using null values?	2	2	5M
		ii) Write SQL statements to create a table for storing book details (BookID, Title, Author, Price, PublishedDate). Ensure constraints are applied properly.	3	2	5M
	OR				
	b	i) Explain the differences between relational algebra and relational calculus.	2	2	5M
		ii) Write SQL statements to perform the following: • Insert a new student into the student table. • Update the student name whose ID is 5. • Delete the record of a student who dropped out.	3	2	5M

4	Unit-III				
	a	i) Retrieve the names of employees who work in the 'Sales' department and earn more than 50000. Tables: Employees(emp_id, name, salary, dept_id), Departments(dept_id, dept_name)	3	3	5M
		ii) List the names of customers and their latest order date, sorted by latest order date descending. Tables: Customers(cust_id, cust_name), Orders(order_id, order_date, cust_id)	3	3	5M
	OR				
	b	i) Write SQL statements to create the following tables with a one-to-many relationship: • Customers(cust_id PRIMARY KEY, cust_name, city) • Orders(order_id PRIMARY KEY, order_date, cust_id FOREIGN KEY REFERENCES Customers(cust_id))	3	3	5M
ii) Create a view HighEarnerView showing employee name and salary for those earning more than 100000.Can this view be updated? Justify your answer.		3	3	5M	
5	Unit-IV				
	a	i) Define a functional dependency. List and explain at least three key properties of functional dependencies	2	4	5M
		ii) Explain the concept of multivalued dependency. Provide a relation that exhibits a non-trivial MVD and show how it violates 4NF.	2	4	5M
	OR				
	b	Compare and Contrast 1NF,2NF and 3NF with example	2	4	10M
6	Unit-V				
	a	Explain how each ACID property ensures the correctness of this transaction.	3	5	10M
	OR				
	b	i) Explain the concept of recoverability in schedules. Give an example of a schedule that is not recoverable and explain why it is a problem.	2	5	5M
ii) Describe the three phases of the optimistic concurrency control protocol. Explain how it handles transaction conflicts.		2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	Define reinforcement learning with a simple example.	K4	1	2M
	b	List any four stages in a typical machine learning pipeline.	K4	1	2M
	c	Differentiate between KNN classification and KNN regression.	K3	2	2M
	d	What is meant by proximity in the context of pattern recognition?	K3	2	2M
	e	What is the principle of the Bayes Classifier?	K3	3	2M
	f	Mention two differences between decision trees and random forests.	K3	3	2M
	g	What is the role of a kernel in a support vector machine (SVM)?	K3	4	2M
	h	What is backpropagation in Multi-Layer Perceptrons (MLPs)?	K3	4	2M
	i	Define the term "soft clustering" with one example.	K4	5	2M
	j	What does the "fuzzy" concept imply in fuzzy c-means clustering?	K4	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 feature engineering? Explain any two common techniques used.	K4	1	5M
		ii) Explain the significance of data acquisition and preprocessing in a machine learning pipeline.	K4	1	5M
	OR				
	b	i) Explain the different paradigms of Machine Learning: supervised, unsupervised, and reinforcement learning.	K3	1	5M
		ii) What is model selection? How does it influence the performance of a machine learning system?	K3	1	5M
3	Unit-II				
	a	i) Describe the working of the K-Nearest Neighbor (KNN) algorithm with an example.	K3	2	5M
		ii) What is Radius Distance Nearest Neighbor? How does it handle classification differently from KNN?	K3	2	5M
	OR				
	b	i) Describe the impact of choosing different values of 'K' in KNN with an example.	K3	2	5M
		ii) Discuss the limitations of KNN models and how they can be addressed.	K3	2	5M

4	Unit-III				
	a	i) What are impurity measures in decision trees? Explain Gini index and entropy.	K4	3	5M
		ii) Explain the bias-variance trade-off in the context of decision trees.	K4	3	5M
	OR				
	b	i) What assumptions are made by the Naive Bayes classifier? When are they valid?	K4	3	5M
		ii) Compare decision trees and Bayes classifiers in terms of performance and use cases.	K4	3	5M
5	Unit-IV				
	a	i) How does backpropagation work in training neural networks?	K3	4	5M
		ii) Explain how a Support Vector Machine (SVM) finds the optimal hyperplane.	K3	4	5M
	OR				
	b	i) Explain the Perceptron Learning Algorithm and its working.	K3	4	5M
		ii) Write the cost function for logistic regression and explain how it is optimized.	K3	4	5M
6	Unit-V				
	a	i) Explain the difference between hard clustering and soft clustering with examples.	K4	5	5M
		ii) Compare partitional and hierarchical clustering approaches.	K4	5	5M
	OR				
	b	i) What is the Expectation-Maximization (EM) algorithm? How is it used in clustering?	K4	5	5M
		ii) Explain spectral clustering and discuss its advantages over traditional clustering techniques.	K4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	Express the given binary number 100010110.10(2) into decimal and octal.	K2	1	2M
	b	Summarize floating point representation.	K2	1	2M
	c	Interpret the purpose of Shift Register?	K2	2	2M
	d	Summarize types of Computers.	K2	2	2M
	e	Compare Hard-wired control unit and microprogrammed control unit.	K2	3	2M
	f	Comment the purpose of Q register in multiplication & division.	K2	3	2M
	g	Define Cache hit, miss and hit ratio.	K1	4	2M
	h	Summarize different types of RAMs and ROMs.	K2	4	2M
	i	Compare Maskable and Non Maskable interrupt?	K2	5	2M
	j	Contrast Isolated vs Memory Mapped I/O	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) Express the given decimal number 657 ₍₁₀₎ into binary, octal and Hexa-decimal and BCD.	K2	1	5M
		ii) Implement the following Boolean function using K-Map. $F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15)$	K3	1	5M
	OR				
	b	i) Explain what is a Combinational Circuit and Draw the block diagram, circuit diagram and function table of 4X1 Multiplexer.	K4	1	5M
		ii) Determine the output of 1's complement and 2's complement subtraction on 87 ₍₁₀₎ and -40 ₍₁₀₎ .	K4	1	5M
3	Unit-II				
	a	i) Explain the functional parts of the Basic computer.	K4	2	5M
		ii) Sketch J-K and T-Flipflops and explain.	K3	2	5M
	OR				
	b	i) Implement Ripple Counter and explain.	K3	2	5M
		ii) Sketch Von-Neumann architecture and explain.	K3	2	5M
4	Unit-III				
		Sketch the flowchart of Booth's Multiplication Algorithm and explain with numerical example.	K3	3	10M

	OR				
	b	i) Explain the execution of complete instruction.	K4	3	5M
		ii) Sketch the diagram of Microprogrammed Control Unit and explain.	K3	3	5M
5	Unit-IV				
	a	i) Interpret the block diagrams of RAM and ROM.	K2	4	5M
		ii) Summarize different Secondary Storage devices.	K2	4	5M
	OR				
	b	Explain different Cache memory mapping techniques in detail with neat diagrams.	K4	4	10M
6	Unit-V				
	a	i) Interpret Modes of data transfer.	K2	5	5M
		ii) Infer the concept of interrupts. Explain how interrupts are handled by the processor and the role of the interrupt service routine?	K2	5	5M
	OR				
	b	Explain the architecture and functioning of Direct Memory Access (DMA).	K4	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

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 What is the method of Lagrange multipliers?	1	1	2M
	b Define an optimization problem.	1	1	2M
	c Discuss feasible solution and optimal solution in LPP.	1	2	2M
	d Explain Linear Programming Problem (LPP) with an example.	1	2	2M
	e What is Transportation Problem in operations research.	1	3	2M
	f What is an initial basic feasible solution (IBFS) in transportation problems?	1	3	2M
	g State the Fibonacci method in optimization.	1	4	2M
	h What is meant by one-dimensional minimization?	1	4	2M
	i Define a multistage decision process.	1	5	2M
	j What is the principle of optimality?	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
Unit-I				
2	a i) Explain the classification of optimization problems based on the nature of the objective function and constraints	2	1	5M
	ii) Solve the following optimization problem using the method of Lagrange multipliers: $\text{Minimize } f(x, y) = x^2 + y^2 \quad \text{Subject to } g(x, y) = x + y - 1 = 0.$	3	1	5M
	OR			
	b i) State and explain the Kuhn-Tucker conditions for solving optimization problems with inequality constraints.	2	1	5M
	ii) Apply KKT conditions to minimize $f(x, y) = (x-3)^2 + (y-2)^2$ Subject to $x+y \leq 4, x \geq 0, y \geq 0$.	3	1	5M
Unit-II				
3	a i) Solve by simplex method $\text{Maximize } Z = 80x_1 + 55x_2 \quad \text{Subject to } 4x_1 + 2x_2 \leq 40, \quad 2x_1 + 4x_2 \leq 32$ and $x_1 \geq 0, x_2 \geq 0$.	3	2	10M
	OR			
	b i) Solve Max $Z = 80x_1 + 55x_2$ Subject to $4x_1 + 2x_2 \leq 40, \quad 2x_1 + 4x_2 \leq 32$ $x_1 \geq 0, x_2 \geq 0$ by graphical method.	3	2	10M

R23

4	Unit-III						3	3	10M	
	a	i)Find the initial basic feasible solution by using North-West Corner Rule								
		W→								
		F↓	W ₁	W ₂	W ₃	W ₄				Factory Capacity
F ₁		19	30	50	10	7				
	F ₂	70	30	40	60	9				
	F ₃	40	8	70	20	18				
	Warehou se Requirem ent	5	8	7	14	34				
OR										
b	i) Find the initial basic feasible solution using Least Cost method					3	3	10M		
		W ₁	W ₂	W ₃	W ₄				Availability	
	F ₁	19	30	50	10				7	
	F ₂	70	30	40	60				9	
	F ₃	40	8	70	20	18				
	Requirement	5	8	7	14					
Unit-IV										
5	a	i) Using Fibonacci method, find the minimum of $f(x)=(x-2)^2+3$ in $[0, 4]$.					3	4	5M	
		ii) Write the general algorithm for solving constrained nonlinear programming problems using Penalty Method.					2	4	5M	
	OR									
	b	i) Differentiate between Interior and Exterior penalty function methods.					2	4	5M	
ii) Minimize $f(x)=x^4-3x^3+2$ using a one-dimensional search method (any suitable method).					3	4	5M			
Unit-V										
6	a	i) Discuss the principle of optimality and its role in dynamic programming.					2	5	5M	
		ii) Solve the following problem using dynamic programming: Maximize $f(x)=3x_1+4x_2+5x_3$ Subject to $x_1+x_2+x_3\leq 10$ and $x_1, x_2, x_3\geq 0$.					3	5	5M	
	OR									
	b	. i) A company has 3 warehouses and 4 retail stores. The transportation costs from each warehouse to each store are given below:					3	5	5M	
		Store 1	Store 2	Store 3	Store 4					
Ware house1		2	3	4	5					
Ware house2		3	2	5	4					
	Ware house3	4	5	2	3					
The demand at each store is 10 units. Use dynamic programming to find the optimal transportation plan that minimizes the total transportation cost.										
ii) Explain how dynamic programming can be used to solve problems with uncertainty.					2	5	5M			

II B.Tech II Semester Supple. Examinations, November-2025



Sub Code: R23CE2204

STRUCTURAL ANALYSIS

Time: 3 hours

(CE)

Max. Marks: 70

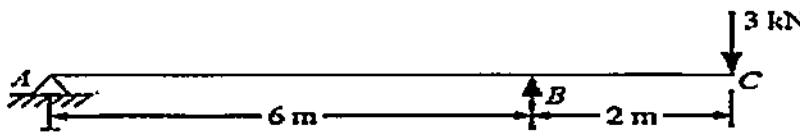
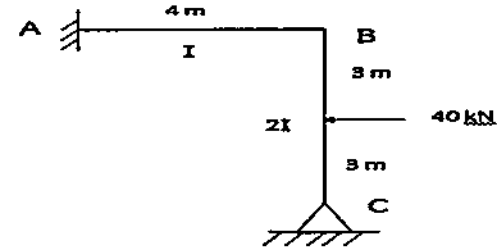
Note: Question Paper consists of Two parts (Part-A and Part-B)

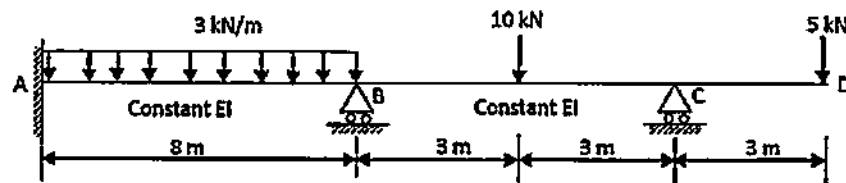
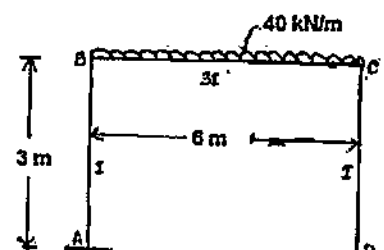
PART-A

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

Q.No		Questions	KL	CO	M
1	a	Write about strain energy in linear elastic system	K2	1	2M
	b	Define strain energy	K1	1	2M
	c	How fixed beams can be statically determinate?	K1	2	2M
	d	How do you determine kinematic indeterminacy?	K1	2	2M
	e	Define a continuous beam.	K2	3	2M
	f	What is the effect of sinking of support for a fixed beam?	K2	3	2M
	g	Define stiffness?	K1	4	2M
	h	Define distribution factor?	K2	4	2M
	i	What are the assumptions made in slope-deflection method?	K1	5	2M
	j	Briefly explain degree of freedom of a structure.	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	Determine the vertical deflection at the free end in the overhanging beam as shown in the Fig. 1 using Castigliano's method. Assume constant EI. 	K3	1	10M
	OR				
	b	State and prove Castigliano's first theorem.	K2	1	10M
3	Unit-II				
	a	Draw SF and BM at any intermediate section of overhanging beams	K2	2	10M
	OR				
	b	Analyse the structure as shown in the Fig.2 using Castigliano's theorem. 	K3	2	10M

Unit-III					
4	a	A fixed beam of span 4 m carries two-point loads of 40kN and 60 kN at 1m and 2m from the left end respectively. Determine the i) Fixed end moments ii) Also draw BMD and SFD.	K2	3	10M
	OR				
	b	A continuous beam ABC consists of two spans AB of length 3m, and BC of length 3m. The span AB carries a point load of 50 KN at its middle points. The span BC carries a point load of 100 KN at 1m from C. The end A is fixed and the end C is simply supported. Find The moments at the supports, reactions at the supports and Draw the B.M diagram.	K3	3	10M
Unit-IV					
5	a	Analyze the continuous beam shown in fig. 3 below, using slope deflection method. Draw shear force and bending moment diagram for the continuous beam.  Fig.3	K3	4	10M
	OR				
	b	Analyze the continuous beam shown in Fig.4 below, using slope deflection method. Draw shear force and bending moment diagram for the continuous beam. Take $E = 210 \times 10^5 \text{ kN/m}^2$ and $I = 110 \times 10^{-6} \text{ m}^4$. Take same EI throughout the beam.	K3	4	10M
Unit-V					
6	a	Analyse the beam shown in Fig.4 by Moment Distribution Method. a). Find the Distribution Factors. b).Find the Final End Moments. c)Draw Bending moment Diagram  Fig.4	K3	5	10M
	OR				
	b	A continuous beam ABC fixed at A and C and simply supported at B, consists of spans AB and BC of lengths 3 m and 6 m respectively. The span AB carries a uniformly distributed load of 15 kN/m while span BC carries a uniformly distributed load of 10 kN/m. Find the moments and reactions at supports using the moment distribution method. Also, draw bending moment and shear force diagrams for the beam.	K3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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 List any two advantages of negative feedback amplifier	L1	1	2M
	b Define positive feedback and negative feedback	L1	1	2M
	c What is the difference between clipping and clamping?	L1	2	2M
	d Define Linear and Nonlinear wave shaping	L1	2	2M
	e Draw the equivalent circuit of OP-Amp	L1	3	2M
	f What is Slew rate. How is it significant?	L1	3	2M
	g What is the role of Commutating Capacitors in multivibrator?	L1	4	2M
	h What are the applications of IC 555Timers	L1	4	2M
	i Why Inverted R-2R DAC is preferred than R-2R DAC?	L1	5	2M
	j Suggest two methods to enhance the performance of A/D converter	L1	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 operation of voltage series feedback amplifier and derive the input resistance, output resistance and gain with the help of neat sketch and necessary equations.	L2	1	5M
	ii) List the Characteristics of negative feedback amplifiers	L2	1	5M
	OR			
	b i) Explain the working of a transformer coupled class A power amplifier with a neat diagram.	L2	1	5M
	ii) Explain crystal oscillator and draw the equivalent circuit of a crystal.	L2	1	5M
3	Unit-II			
	a i) Derive the design equation of RC Integrator. Show that output voltage is directly proportional to the integral of input voltage.	L5	2	5M
	ii) Demonstrate the working of negative clamper circuit. Draw the required waveforms.	L3	2	5M
	OR			
	b i) Identify the condition that must be satisfied by a RC circuit to behave as a differentiator. A symmetrical square-wave of 20Hz with peak-to-peak amplitude of 2V is applied to the input of a high pass circuit. Calculate and plot the output waveform. Given lower 3 dB frequency is 10Hz.	L4	2	5M

		ii) Examine that how the diodes can be used in clipping circuits using suitable circuit diagrams?	L4	2	5M
4	Unit-III				
	a	i) Explain the operation of a differential Op amp with a neat sketch.	L2	3	5M
		ii) Explain the operation of a non-inverting op amp with the help of necessary equations and diagrams.	L2	3	5M
	OR				
	b	i) Interpret the DC and AC characteristics of Op Amp	L4	3	5M
		ii) With a suitable circuit diagram demonstrate the operation of Instrumentational amplifier	L4	3	5M
5	Unit-IV				
	a	i) With a neat sketch demonstrate the operation of Astable multivibrator and draw its output waveforms using Op amp	L3	4	5M
		ii) Determine the value of capacitors to be used in an astable multivibrator to provide a train of pulse 2 μ sec wide at a repetition rate of 75 kHz with $R1 = R2 = 10\text{ k}\Omega$	L3	4	5M
	OR				
	b	i) Compare multivibrators	L4	4	5M
		ii) Design a square wave generator using IC 555 Timer for a frequency of 120Hzs and 60% duty cycle. Assume $C = 0.2\text{ }\mu\text{f}$	L4	4	5M
6	Unit-V				
	a	i) Construct the functional diagram of the dual slope ADC and illustrate the operation of it with respect to output waveform.	L3	5	5M
		ii) Demonstrate the working of success approximation ADC	L3	5	5M
	OR				
	b	i) Discuss the working of a weighted resistor type DAC.	L2	5	5M
		ii) Explain the working of inverted R-2R ladder type D/A converter	L2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-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	Write the disadvantages of hydro power plants?	1	1	2M
	b	Write the need of cooling towers in thermal power plants?	1	1	2M
	c	What is the function of reflectors in nuclear reactors?	1	2	2M
	d	Write the advantages of nuclear power plants?	1	2	2M
	e	What is the main function of a substation?	1	3	2M
	f	Write the disadvantages of gas insulated substations?	1	3	2M
	g	What is the basic function of electrical distribution system?	1	4	2M
	h	Write the advantages of high voltage distribution system?	1	4	2M
	i	How the connected load can be calculated?	1	5	2M
	j	What is meant by semi fixed costs of electrical 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	Draw the general out diagram and explain in detail about the working principle of hydro power generating plants?	2	1	10M
	OR				
	b	Describe the power generation by using the thermal power plants with detailed layout diagram?	2	1	10M
3	Unit-II				
	a	Write the site selection criterion and explain the working principle of nuclear power plants?	2	2	10M
	OR				
	b	Draw neat diagrams and explain the properties of PWR and BWR used in the nuclear power generation?	2	2	10M
4	Unit-III				
	a	Draw the diagrams and explain the comparison between single bus bar with and without sectionalization switch arrangements?	2	3	10M
	OR				
	b	Draw the layout diagram and explain the role of 33/11kV substation?	2	3	10M
5	Unit-IV				
	a	Derive and analyze the insulation resistance and electrical stress on the underground cables?	3	4	10M

	OR				
	b	A single core lead sheathed cable graded by using three dielectrics of relative permittivity 6, 5 and 4 respectively. The conductor diameter is 2.5cm and over all diameter is 7.8cm. If the three dielectrics are worked at same maximum stress of 44kV/cm, calculate the working voltage of the cable? Find the values of safe working voltage for an un graded cable, assuming the same conductor and over all diameter and the maximum dielectric stress?	3	4	10M
6	Unit-V				
	a	List out and explain in detail about different types of tariffs?	2	5	10M
	OR				
	b	Write the differences between load curve and load duration curves and solve the following problem? From the following data estimate the cost per kWh of the generating station? Plant capacity is 54kW, annual load factor is 45%, capital cost is Rs 11×10^6 , annual cost of wages and taxes is 3,50,000/-. the cost of fuel, lubrication, maintenance is Rs 16, 32,000/-. The annual interest and depreciation is 9% of initial value?	3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	List the differences between cage rotor and slip ring rotor?	K1	1	2M
	b	Why an Induction motor is called as rotating transformer?	K1	1	2M
	c	Give the conditions for maximum torque for 3-phase induction motor?	K1	2	2M
	d	What is the need of starter for induction motor?	K1	2	2M
	e	Name the methods of starting single phase induction motor.	K1	3	2M
	f	What are the applications of AC series motor	K1	3	2M
	g	What is Potier reactance	K1	4	2M
	h	What is distributed winding	K1	4	2M
	i	List the various losses present in a synchronous motor	K1	5	2M
	j	List out the methods of starting of synchronous motor	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 working principle of three phase induction motor	K1	1	5M
		ii) A 3-Phase induction motor wound for 4 poles and is supplied from 50Hz system. Calculate (A) Synchronous speed (B) rotor speed when slip is 4% and (C) rotor frequency when runs at 600 rpm	K2	1	5M
	OR				
	b	i) A 3-phase 400 V, 50 Hz induction motor takes a power input of 35kW at its full load speed of 980 rpm. The total stator losses are 1kW and friction and windage losses are 1.5 kW. Calculate (A) slip (B) rotor ohmic losses (C) Shaft power (D) shaft torque and (E) efficiency	K2	1	5M
		ii) Develop and explain the equivalent circuit of Three phase induction motor	K2	1	5M
3	Unit-II				
	a	i) Draw the torque-slip characteristics of a 3-phase induction motor. Explain them briefly.	K2	2	5M
		ii) Explain the principle of speed control of a 3-phase induction motor by V/f method and draw the corresponding torque-speed characteristics.	K2	2	5M

	OR				
	b	Draw the circle diagram for a 3.73 kW, 200 V, 50 Hz, 4 pole, 3 Phase Y connected Induction motor from the following test data: No- Load test data: 200 V, 5 A, 350 W Blocked rotor test: 100V, 26A, 1700 W Estimate from the diagram for full load condition, the line current, power factor and the maximum torque in terms of the full load torque. The rotor cu loss at stand still is half the total Cu loss.	K3	2	10M
4	Unit-III				
	a	i) Explain double revolving field theory of single phase induction motor.	K2	3	5M
		ii) Explain the equivalent circuit of single phase induction motor and give all necessary equations.	K2	3	5M
	OR				
	b	i) Explain the working principle and torque-speed characteristics of Capacitor start induction motor	K2	3	5M
ii) Explain the principle of operation of shaded pole induction motor		K2	3	5M	
5	Unit-IV				
	a	Describe the main constructional features of cylindrical rotor and salient pole rotor alternators.	K1	4	10M
	OR				
	b	i) What is voltage regulation? Discuss the EMF method of calculating voltage regulation of an alternator	K2	4	6M
ii)What are the conditions for Parallel operation of alternators.		K1	4	4M	
6	Unit-V				
	a	i) Explain why synchronous motor is not self starting?	K2	5	5M
		ii)Describe briefly the effect of varying excitation upon the armature current and power factor of a synchronous motor when input power to the motor is maintained constant.	K2	5	5M
	OR				
	b	i) Write short notes on synchronous condenser for power factor improvement.	K1	5	5M
ii) Explain the effect of damper winding on the performance of a synchronous machine.		K2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

Sub Code: R23EE2205

CONTROL SYSTEMS

Time: 3 hours

(EEE)

Max. Marks: 70

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

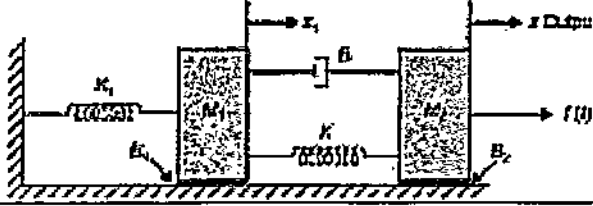
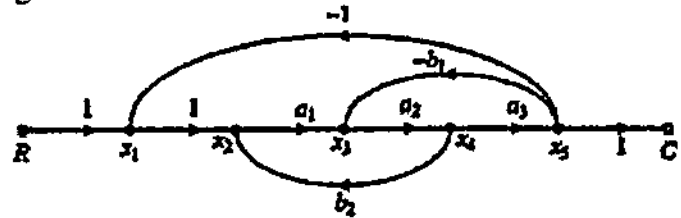
PART-A

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

Q.No		Questions	KL	CO	M
1	a	Define Transfer function of control system	K1	1	2M
	b	What are the basic elements used for modeling mechanical translational system? Write the force balance equation of basic elements	K1	1	2M
	c	What is the effect of PD, PI controller on system performance?	K1	2	2M
	d	Define stability and what is the necessary condition for stability?	K1	2	2M
	e	Define Gain Margin.	K1	3	2M
	f	What is the difference polar plot and Nyquist plot	K1	3	2M
	g	What is the need of lag compensators	K1	4	2M
	h	Why frequency domain compensation is normally carried out using the Bode plots?	K1	4	2M
	i	What are the advantages of state space analysis?	K1	5	2M
	j	Write the properties of state transition matrix	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	Obtain the transfer function of the mechanical system shown in below Fig. 	K2	1	10M
	OR				
	b	i) The signal flow of a system is shown in the figure below. Using Mason's gain formula to calculate the overall gain C/R of the system shown in the figure. below 	K2	1	5M
		Derive the transfer function and develop the block diagram of Armature controlled DC servo motor	K2	1	5M

3	Unit-II				
	a	i) A unity feedback system is characterized by the open loop transfer function $G(s) = \frac{1}{s(1+0.3s)(1+0.4s)}$ Determine the steady state error for unit step, unit ramp and unit acceleration inputs.	K2	2	5M
		ii) Derive the Time response of a second order system for a unit step input and plot its response	K1	2	5M
	OR				
	b	i) Draw the root loci of the open loop transfer function of the feedback control system $G(s)H(s) = \frac{k}{s(s+4)(s+5)}$	K2	2	6M
		ii) Using the RH stability of the following characteristic equation $s^4+s^3+2s^2+2s+K$ Determine the range of K for the system to be stable: Further determine the number of roots, if any, in the right-hand plane	K2	2	4M
4	Unit-III				
	a	For feedback control system $G(S)H(S) = \frac{40}{(s+4)(s^2+2s+2)}$. Find the gain margin and stability from the Nyquist plot.	K3	3	10M
	OR				
b	Sketch the bode plots and determine the gain cross-over and phase cross-over frequencies for the transfer function $G(s) = \frac{10}{(1+0.5s)(1+0.1s)}$	K2	3	10M	
5	Unit-IV				
	a	i) List the limitations of lag, lead, lag-lead compensators.	K1	4	5M
		ii) Explain the realization of basic lag compensator using a Bode plot	K2	4	5M
	OR				
	b	i) Consider a unity feedback system with open loop transfer function $G(s) = \frac{k}{s(s+1)(s+2)}$ design a suitable compensator so that the compensated system has $K_v = 10 \text{ sec}^{-1}$ Phase margin = 40° Gain margin = 12db	K3	4	10M
6	Unit-V				
	a	i) Construct the state model for a system characterized by the differential equation $\ddot{y} + 6\dot{y} + 11y = 4u$	K2	5	5M
		ii) Obtain the transfer function for the system $\dot{X} = \begin{bmatrix} -1 & 0 & -1 \\ 0 & -1 & 1 \\ 1 & -2 & -3 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} u$ $Y = \begin{bmatrix} 1 & 0 & 1 \end{bmatrix} X$	K2	5	5M
	OR				
	b	Discuss the concept of controllability and observability with an example	K1	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-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	State the Fayol's principles.	KL	1	2M
	b	Differentiate between process and product layout	K2	1	2M
	c	Explain application of method study	K1	2	2M
	d	What are the therbligs	K3	2	2M
	e	Differentiate between Quality control and Quality assurance	K1	3	2M
	f	Outline about Zero Defect Concept.	K2	3	2M
	g	Compare Fixed Capital and Working Capital	K2	4	2M
	h	Explain about IRR Method	K2	4	2M
	i	What is wage incentive plan	K2	5	2M
	j	Define SCM	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	Define the term industrial engineering (IE), Explain the major development of industrial engineering, applications in the current industries.	K2	1	10M
	OR				
	b	i) Explain the advantages and disadvantages of product layout.	K2	1	5M
		ii) Discuss the Quantitative techniques for optimal design of layouts	K2	1	5M
3	Unit-II				
	a	i) What is the time study? Explain	K2	2	5M
		ii) Discuss the major differentia between batch production and job production.	K2	2	5M
	OR				
	b	Explain the string diagrams and Therbligs in detail by make use of an example.	K3	2	10M

4	Unit-III				
	a	What are Control charts? Explain the X and S charts with examples and also list its advantages.	K3	3	10M
	OR				
	b	i) Define Six-Sigma and Explain its role in current manufacturing industries. ii) What is quality circle and explain in brief its implementation procedure in industry.	K3	3	5M
5	Unit-IV				
	a	Explain about Working Capital in detail	K3	4	10M
	OR				
6	b	Analyze the Investment Appraisal Techniques of NPV, IRR & PI.	K3	4	10M
	Unit-V				
	a	i) List the functions of personnel management?	K3	5	5M
	a	ii) List and explain the different wage incentive plans with suitable examples	K3	5	5M
	OR				
	b	Discuss in detail about enterprise resource planning (ERP).	K4	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-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	State Cauchy's integral formula.	1	1	2M
	b	Define an harmonic function.	1	1	2M
	c	Explain Taylor's theorem in complex variable.	1	2	2M
	d	Explain Cauchy's Residue theorem.	1	2	2M
	e	Define Probability mass function.	1	3	2M
	f	Define Discrete random variable.	1	3	2M
	g	Define sampling.	1	4	2M
	h	A random sample of size 100 as S.D. of 5. What can you say about the maximum error with 95% confidence.	1	4	2M
	i	Explain F- test for equality of population variances.	1	5	2M
	j	Explain type-I and type-II errors.	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) Prove that the function $f(z) = \sin z$ is an analytic function.	3	1	5M
		II) Find an analytic function whose real part is $u = y + e^x \cos y$.	3	1	5M
	OR				
	b	I) Find all values of k , such that $f(z) = e^x (\cos ky + i \sin ky)$ is analytic.	3	1	5M
		II) Evaluate $\oint_C (x+y)dx + x^2 dy$ along $y=3x$ between $(0,0)$ and $(3,0)$	3	1	5M
3	Unit-II				
	a	I) Expand $\log z$ by Taylor series about $z=1$.	3	2	5M
		II) Find the poles of the function $f(z) = \frac{1}{(z+1)(z+3)}$ and residue at these poles.	3	2	5M
	OR				
	b	I) Find the Taylor series of $\log(1+e^z)$ about $z=0$.	3	2	5M
		II) Evaluate the poles of the function $f(z) = \frac{z^2}{(x-1)(x-3)^2}$ and the residues at the poles.	3	2	5M

4	Unit-III				
	a	I)A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the Expected number of defective items.	3	3	5M
		II)In a test on 2000 electric bulbs, it was found that the life of a particular make , was normally distributed with an average life of 2040 hours and standard deviation of 60 hours.Find the number of bulbs likely to burn for (i) more than 2150 hours (ii) Less than 1950 hours (iii) more than 1920 hours and but less than 2160 hours	3	3	5M
	OR				
	b	I)20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective (iii) $P(1 < x)$	3	3	5M
		II)Suppose a continuous random variable X has the probability density function $f(x)=K((1-x)^2)$ for $0 < x$	3	3	5M
5	Unit-IV				
	a	I)A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.	3	4	5M
		II)A random sample of size 10 was taken from a population S.D. of sample is 0.3. Find the maximum error with 99% confidence.	3	4	5M
	OR				
	b	I)Assuming that S.D is 20, how large a random sample is taken to assert with probability 0.95 that the sample mean will not differ from the true mean by more than 3.0 points ?	3	4	5M
		II)A random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and the variance $\sigma^2 = 256$. What is the probability that will be between 75 and 78.	3	4	5M
6	Unit-V				
	a	I)Among 900 people in a state 90 are found to be chapati eaters. Construct 99% confidence interval for the true proportion.	3	5	5M
		II)20 people were attacked by a disease and only 18 survived will you reject the hypothesis is that the survival rate if attacked by this diseases is 85% in favour of the hypothesis that is more at 5% level.	3	5	5M
	OR				
	b	A random sample of six steel beams has a mean compressive strength of 58392 p.s.i. (pounds per square inch) with a standard deviation of 648 p.s.i. use this information and the level of significance $\alpha = 0.05$ to test whether the true average compressive strength of the steel from which this sample came is 58000 p.s.i. assume normality.	3	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

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 out the types of patterns used for sand casting	K1	1	2M
	b	Define the function of blind riser in gating system	K2	1	2M
	c	Classify the types of flames used in gas welding	K1	2	2M
	d	Write the advantages of TIG welding	K2	2	2M
	e	Define the function of strain hardening process	K1	3	2M
	f	Write any two characteristics of extrusion process	K1	3	2M
	g	What are the disadvantages of sheet metal forming	K1	4	2M
	h	List out the press tools used in forming process	K1	4	2M
	i	Define Additive Manufacturing	K2	5	2M
	j	Write the principle of wire arc additive manufacturing	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) List out the defects in casting process. Explain its causes and give remedies	K2	1	5M
		ii) Explain the types of pattern allowances considered during molding process.	K3	1	5M
	OR				
	b	i) Describe the process of centrifugal casting with neat sketch. Write its advantages?	K2	1	5M
		ii) Explain the principle of investment casting with neat sketch	K3	1	5M
3	Unit-II				
	a	i) Describe the oxy-acetylene gas welding technique and give the applications.	K2	2	5M
		ii) Explain the reasons and effects of Heat affected zone in welding?	K3	2	5M
	OR				
	b	i) Explain the process of thermit welding with neat sketch.	K3	2	5M
		ii) Enumerate the differences between soldering and brazing	K4	2	5M
4	Unit-III				
	a	i) Explain the changes in structure and properties during cold working, recovery and recrystallization	K3	3	5M
		ii) Explain the various forging operations and list the forging defects.	K3	3	5M

	OR				
	b	i) Why are multiple passes usually required in wire drawing operations? Explain	K2	3	5M
		ii) Explain forward extrusion and backward extrusion with neat sketches	K3	3	5M
5	Unit-IV				
	a	i) Distinguish between bending and drawing in sheet-metal operations	K4	4	5M
		ii) Define electromagnetic forming. Give its advantages and disadvantages	K2	4	5M
	OR				
	b	i) Explain about hot spinning and cold spinning applications	K3	4	5M
		ii) Define Electro hydraulic forming. Write its advantages and applications	K2	4	5M
6	Unit-V				
	a	i) Describe the steps involved in Additive Manufacturing? Explain in brief.	K2	5	5M
		ii) Explain the working of Fused Deposition Modelling process with neat sketch.	K3	5	5M
	OR				
	b	i) Classify the Additive manufacturing techniques in brief and materials used in each technique	K2	5	5M
		ii) Explain the principle of Selective laser sintering AM process and give its applications.	K3	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

Sub Code: R23EC2202

LINEAR CONTROL SYSTEMS

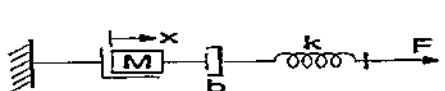
Time: 3 hours

(ECE)

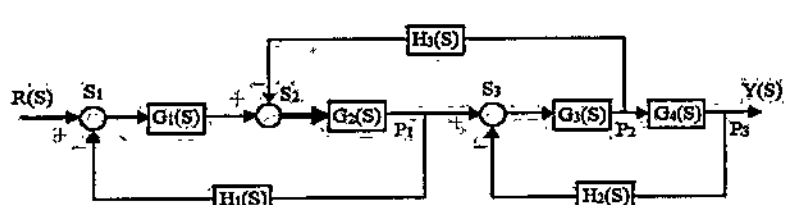
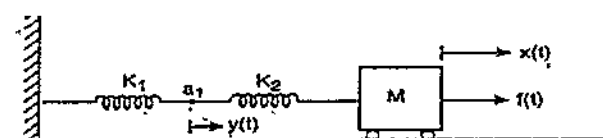
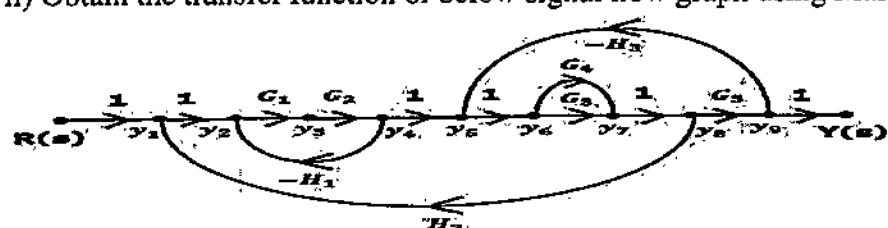
Max. Marks: 70

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 Control system	K2	1	2M
	b Draw the Equivalent Electrical circuit for the mechanical system shown in fig using Force – Voltage Analogy 	K2	1	2M
	c Define Steady State Error.	K2	2	2M
	d Define type and order of the system.	K2	2	2M
	e State the Routh stability criterion	K2	3	2M
	f What is centroid in relation with root locus? How it can be calculated	K2	3	2M
	g Define Gain Margin and Phase Margin.	K2	4	2M
	h Explain Nyquist stability criterion	K2	4	2M
	i Define Controllability and write condition for it	K2	5	2M
	j Define state and state variable	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
1	Unit-I			
	a i) Compare Open loop and Closed loop Systems. ii) For the system represented by block diagram shown in figure. Determine $Y(s)/R(s)$. 	K2	1	5M
2	OR			
	b i) For the mechanical system shown in fig. Compute the transfer function $X(s)/F(s)$.  ii) Obtain the transfer function of below signal flow graph using Mason's Gain formula 	K3	1	5M

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	Define Ampere's law.	2	1	2M
	b	Define Gauss Law.	2	1	2M
	c	Define Faraday's law.	2	2	2M
	d	Write Maxwell's equations for the static fields.	4	2	2M
	e	Define Poynting Theorem.	2	3	2M
	f	Explain Brewster Angle.	3	3	2M
	g	Define group velocities.	3	4	2M
	h	List different transmission lines types.	2	4	2M
	i	Define VSWR in transmission lines.	3	5	2M
	j	Explain reflection coefficient.	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 electric field intensity due to a point charge.	3	1	5M
		ii) Explain Ampere's law applications.	3	1	5M
	OR				
	b	i) Explain Gauss law applications.	3	1	5M
		ii) Explain magnetic flux density in detail.	3	1	5M
3	Unit-II				
	a	i) Derive the expression for the transformer EMF.	3	2	5M
		ii) Explain the inconsistency of Ampere's Law for time-varying fields and how it was modified by Maxwell, including the concept of displacement current density.	4	2	5M
	OR				
	b	i) Write down Maxwell's equations in differential form for time-varying fields and provide the word statement for each equation.	3	2	5M
		ii) Derive the continuity equation for electric current from Maxwell's equations.	3	2	5M

4	Unit-III				
	a	i) Define a uniform plane wave. Derive the relationship between the electric field intensity (E) and the magnetic field intensity (H) for a uniform plane wave propagating in free space.	3	3	5M
		ii) State the electric and magnetic boundary conditions that must be satisfied at the interface between two different dielectric media.	4	3	5M
	OR				
	b	i) Explain the phenomenon of polarization of electromagnetic waves and briefly describe linear and circular polarization.	4	3	5M
		ii) Explain critical angle and internal reflection.	3	3	5M
5	Unit-IV				
	a	i) Derive the transmission line equations relating voltage and current along the line.	3	4	5M
		ii) Draw the equivalent circuit of a short length (Δz) of a transmission line and define its primary parameters (R, L, G, C).	4	4	5M
	OR				
	b	i) Define the characteristic impedance (Z_0) and the propagation constant (γ) of a transmission line in terms of its primary constants.	4	4	5M
		ii) Explain the concept of an infinite transmission line and discuss the significance of its characteristic impedance.	3	4	5M
6	Unit-V				
	a	i) Derive the expression for the input impedance of a transmission line of length l terminated with a load impedance Z_L .	3	5	5M
		ii) Explain how a $\lambda/2$ transmission line can be used to repeat the load impedance at the input. Provide a relevant application of this property.	4	5	5M
	OR				
	b	i) Discuss how a $\lambda/4$ transmission line can be used as an impedance transformer.	3	5	5M
		ii) Explain the behavior of a short-circuited (SC) transmission line and an open-circuited (OC) transmission line in terms of their input impedance.	4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks



NARASARAOPETA ENGINEERING COLLEGE (AUTONOMOUS)

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	Define the hybrid- π capacitance C_{μ} in the context of a BJT high-frequency model.	2	1	2M
	b	What is the significance of the cut-off frequency (f_H) of a Common Emitter amplifier?	2	1	2M
	c	List two primary advantages of cascading multiple amplifier stages.	2	2	2M
	d	What is the key characteristic that distinguishes a Darlington pair amplifier from a simple common-emitter amplifier?	3	2	2M
	e	State two benefits of using negative feedback in an amplifier circuit.	2	3	2M
	f	Draw the block diagram of a voltage-series feedback topology.	2	3	2M
	g	Define oscillator principle.	2	4	2M
	h	In a Wien bridge oscillator, what determines the frequency of oscillation?	3	4	2M
	i	What is the primary difference in the operating point location between a Class A and a Class B power amplifier?	3	5	2M
	j	Why are heat sinks often necessary for power transistors in high-power amplifier applications?	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) Derive the expression for the Common Emitter short-circuit current gain, A_{is} , of a BJT using the hybrid- π model, in terms of its hybrid- π parameters.	3	1	5M
		ii) Explain the factors that limit the high-frequency response of a BJT Common Emitter amplifier. How do the internal capacitances of the transistor play a role?	3	1	5M
	OR				
	b	i) For a Common Source FET amplifier at high frequencies, draw the small-signal equivalent circuit and explain the significance of each component.	3	1	5M
		ii) Describe the process of determining the high-frequency hybrid- π parameters of a BJT based on its low-frequency parameters and device specifications.	4	1	5M
3	Unit-II				
	a	i) Analyze a two-stage RC-coupled Common Emitter amplifier. Draw the circuit diagram and discuss how the overall voltage gain and bandwidth are determined by the individual stages.	4	2	5M

		ii) Explain the operation and advantages of a Cascode amplifier configuration. How does it improve the high-frequency performance compared to a single-stage amplifier?	3	2	5M
	OR				
	b	i) With the aid of a circuit diagram, explain the principle of operation of a Darlington pair amplifier.	4	2	5M
		ii) Describe the concept and implementation of a bootstrap emitter follower circuit. Explain how it achieves a high input resistance.	3	2	5M
4	Unit-III				
	a	i) Discuss the four basic feedback topologies (voltage-series, current-series, voltage-shunt, current-shunt).	3	3	5M
		ii) Derive the expressions for the closed-loop gain, input impedance, and output impedance of a voltage-series negative feedback amplifier in terms of the open-loop gain and feedback factor.	4	3	5M
	OR				
	b	i) Compare and contrast the effects of negative feedback on the bandwidth and distortion of an amplifier. Explain the trade-offs involved.	3	3	5M
		ii) Outline a systematic method for analyzing a feedback amplifier circuit to determine its closed-loop gain and input/output impedances.	4	3	5M
5	Unit-IV				
	a	i) Explain the principle of operation of an RC phase shift oscillator using a BJT. Derive the expression for the frequency of oscillation and the condition for sustained oscillations.	3	4	5M
		ii) With a circuit diagram, explain the operation of a Colpitt's oscillator using a BJT. Derive the expression for its frequency of oscillation.	4	4	5M
	OR				
	b	i) Discuss the factors that affect the frequency stability of an oscillator. Describe techniques used to improve the frequency stability.	3	4	5M
		ii) Compare and contrast Hartley and Colpitt's LC oscillators in terms of their circuit configuration and the components that determine the frequency of oscillation.	4	4	5M
6	Unit-V				
	a	i) Explain the operation of a Class B push-pull power amplifier. Discuss how it overcomes the limitations of a Class A amplifier in terms of efficiency.	3	5	5M
		ii) Describe the circuit and operation of a complementary symmetry push-pull amplifier using transistors.	4	5	5M
	OR				
	b	i) Discuss the phenomenon of thermal runaway in power transistors.	3	5	5M
		ii) Analyze the frequency response of a single-tuned capacitive coupled amplifier and discuss the relationship between its bandwidth and Q-factor.	4	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	What is the envelope of the AM wave?	K2	1	2M
	b	What is the BW for the AM wave?	K1	1	2M
	c	What are the demodulation methods for the DSB-SC signal?	K1	2	2M
	d	When does overmodulation take place, and what is its effect?	K2	2	2M
	e	Define modulation index for FM. How is it different from AM?	K2	3	2M
	f	What is the difference between FM and PM?	K2	3	2M
	g	What are the drawbacks of a TRF receiver?	K2	4	2M
	h	Define the Selectivity of a receiver.	K1	4	2M
	i	What do you mean by thermal noise?	K2	5	2M
	j	Why is it called white noise?	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) What is the principle of Amplitude modulation? Derive an expression for the AM wave and draw its spectrum.	K2	1	5M
		ii) The antenna current of an AM transmitter is 8 A if only the carrier is sent, but it increases to 8.93 A if the carrier is modulated by a single sinusoidal wave. Determine the percentage modulation. Also, find the antenna current if the percent of modulation changes to 0.8.	K3	1	5M
	OR				
	b	i) An AM broadcast radio transfer radiates 10 kW of power if the modulation percentage is 60. Calculate how much of this is the carrier power.	K3	1	5M
		ii) Explain the square law diode modulation method for AM generation.	K2	1	5M
3	Unit-II				
	a	i) Sketch and explain how a ring modulator generates a DSB-SC signal.	K2	2	5M
		ii) Derive the expression for the AM wave for more than one modulating signal.	K3	2	5M
	OR				
	b	i) Explain the phase-shift method of SSB generation.	K2	2	5M
		ii) Explain the Coherent Detection of DSB-SC.	K2	2	5M

4	Unit-III				
	a	i) Derive an expression for a single-tone narrowband frequency-modulated wave.	K3	3	5M
		ii) Explain the Armstrong method for the generation of wideband FM.	K2	3	5M
	OR				
	b	i) Draw the block diagram of a balanced frequency discriminator and explain it for the demodulation of an FM signal.	K2	3	5M
		ii) Find the bandwidth of commercial FM transmission assuming frequency deviation $\Delta f = 75$ KHz and bandwidth of modulating signal $f_m = 20$ KHz.	K3	3	5M
5	Unit-IV				
	a	i) Explain the characteristics of Radio receivers in detail.	K1	4	5M
		ii) Draw the block diagram of a superheterodyne receiver to explain its operation.	K2	4	5M
	OR				
	b	i) Write a short note on the TRF receiver.	K2	4	5M
		ii) In a superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit (at the input of the mixer) is 100. If the intermediate frequency is 455 kHz, calculate the following: (a) the image frequency and image frequency rejection ratio at 950 kHz, and (b) the image frequency and its rejection ratio at 10 MHz.	K3	4	5M
6	Unit-V				
	a	i) Two resistors $10\text{ k}\Omega$ and $25\text{ k}\Omega$ are at room temperature (290° K) for a bandwidth of 150 kHz. Calculate thermal noise for each resistor, if two resistors are in series and two in parallel.	K3	5	5M
		ii) Write a short note on: TDM	K2	5	5M
	OR				
	b	i) An amplifier has a noise figure of 3 dB. Determine its equivalent noise temperature.	K3	5	5M
		ii) Write a short note on: FDM	K2	5	5M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

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	What is Hamming Code?	1	1	2M
	b	Distinguish between NAND or NOR gates.	1	1	2M
	c	Explain the NAND gate with example.	1	2	2M
	d	What are the Latches?	1	2	2M
	e	What is micro operation?	1	3	2M
	f	What is T-state?	1	3	2M
	g	What is implied addressing mode?	1	4	2M
	h	What is microprogramming?	1	4	2M
	i	State advantages of cache memory	1	5	2M
	j	State the importance of Main memory in a Computer System	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 Error Detecting Codes with examples	2	1	5M
		ii) Discuss Floating Point Representation.	2	1	5M
	OR				
	b	Explain Karnaugh map representation with example.	2	1	10M
3	Unit-II				
	a	i) State Combinatorial Circuit Design Procedure	2	2	5M
		ii) Explain Multiplexers and De-multiplexers	2	2	5M
	OR				
	b	i) State different Flip flops with examples	2	2	5M
		ii) Explain the functioning of Shift Registers	2	2	5M
4	Unit-III				
	a	Explain Booth multiplication algorithm with example	2	3	10M
	OR				
	b	i) Draw and explain the Register Transfer language	2	3	5M
		ii) Explain Instruction cycle.	2	3	5M
5	Unit-IV				
	a	i) Explain the design of micro programmed control unit	2	4	10M

6	OR				
	b	i) Explain addressing modes with examples	2	4	10M
	Unit-V				
	a	i) State the need of Associate memory. Explain associate memory and set associate memory with example	2	5	10M
	OR				
	b	i) Explain Direct Memory Access(DMA) with neat sketch	2	5	10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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	State Gauss's lemma	K3	1	2M
	b	Find the GCD of 48 and 18 using the Euclidean Algorithm.	K3	1	2M
	c	State the condition under which the Chinese Remainder Theorem can be applied.	K2	2	2M
	d	What is a system of linear congruences? Give an example.	K2	2	2M
	e	Use Fermat's Little Theorem to find the remainder when 3^6 is divided by 7.	K3	3	2M
	f	A number leaves remainder 1 when divided by 2, and remainder 3 when divided by 4. Write this as a system of congruences.	K3	3	2M
	g	State the Law of Quadratic Reciprocity.	K3	4	2M
	h	Give an example of a pseudoprime to base 2.	K3	4	2M
	i	What is the main advantage of public-key cryptography over symmetric key cryptography?	K3	5	2M
	j	What is the difference between cryptography and cryptanalysis?	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) Describe in detail how a CPU's Arithmetic Logic Unit (ALU) performs addition and subtraction on n-bit two's-complement integers.	K3	1	5M
		ii) State the Well-Ordering Property of the natural numbers. Explain how this property is used to prove that every non-empty set of natural numbers has a least element.	K3	1	5M
	OR				
	b	i) Solve the linear Diophantine equation $56x + 72y = 8$. Find all integer solutions and explain each step in detail.	K2	1	5M
		ii) Explain the Euclidean Algorithm for finding the greatest common divisor (GCD) of two integers. Provide a detailed example.	K3	1	5M
3	Unit-II				
	a	i) Define congruence in number theory. Explain the properties of congruences and give examples to illustrate each property.	K3	2	5M
		ii) Describe the method to solve the system of linear congruences using the Chinese Remainder Theorem. Illustrate the steps clearly.	K3	2	5M

	OR				
	b	i)State and explain the Chinese Remainder Theorem.	K3	2	5M
		ii)Discuss the application of congruences and the Chinese Remainder Theorem in cryptography.	K3	2	5M
4	Unit-III				
	a	i)Discuss the importance and applications of perpetual calendars in computing and everyday life. What are the challenges in designing a perpetual calendar algorithm?	K3	3	5M
		ii)Define a round-robin tournament. How can you schedule matches so that each team plays every other team exactly once? Discuss the algorithm for generating such a schedule.	K3	3	5M
	OR				
	b	i)Explain the concept of hashing in computer file storage. How do hashing functions help in efficient data retrieval?	K3	3	5M
		ii)Given that $2^{13}-1=8191$ is a Mersenne prime, find the corresponding perfect number.	K3	3	5M
5	Unit-IV				
	a	i)Define a finite field. Explain the structure of finite fields and give examples.	K3	4	5M
		ii)You have a composite number $n=8051$. Demonstrate how Pollard's Rho algorithm can be applied to factor n . Explain each step briefly.	K3	4	5M
	OR				
	b	i)Define pseudo primes and distinguish between Fermat pseudo primes and strong pseudo primes.	K3	4	10M
6	Unit-V				
	a	i)Explain the key generation process in RSA cryptosystem. Include how the public and private keys are computed.	K3	5	5M
		ii)Describe the concept of public-key cryptography. Compare it with symmetric-key cryptography in terms of key management, security, and efficiency.	K3	5	5M
	OR				
	b	i)Define exponentiation cipher and explain its working principle with an example.	K3	5	5M
ii)Explain the basic idea of the knapsack problem. How is it used in knapsack ciphers?		K3	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

II B.Tech II Semester Supple. Examinations, November-2025

R23

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 are the two fundamental ways by which network performance is measured?	1	1	2M
	b	Mention two key differences between the Mobile and Wireless Access Networks.	3	1	2M
	c	What are the responsibilities of Application Layer?	2	2	2M
	d	What is HTTPS and how does it differ from HTTP?	2	2	2M
	e	What is the primary function of the Transport Layer in networking?	2	3	2M
	f	What are the techniques used in multiplexing?	1	3	2M
	g	List two routing algorithms used in single network routing.	1	4	2M
	h	Compare IPv4 and IPv6	3	4	2M
	i	What is a Sliding Window Protocol?	2	5	2M
	j	State the difference between Fast Ethernet and Gigabit Ethernet.	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	List the seven layers in OSI model and demonstrate the functionalities of each layer in detail.	2	1	10M
		OR			
	b	i) Differentiate between TCP/IP network model and ISO-OSI reference model. ii) Compare and contrast Local Area Networks (LAN) and Metropolitan Area Networks (MAN)	2 4	1 1	5M 5M
3		Unit-II			
	a	Illustrate the architecture of electronic mail and explain the functions of each component in the email system.	3	2	10M
		OR			
	b	i) Demonstrate the process of message transfer and final delivery in electronic mail systems. ii) Compare the architectural overview of static and dynamic web objects in the World Wide Web	2 4	2 2	5M 5M

4	Unit-III				
	a	i) Compare and contrast TCP and UDP Protocols.	4	3	5M
		ii) Describe the process of congestion control in network communication	2	3	5M
	OR				
	b	i) Illustrate the TCP segment header and explain the function of each field with examples.	3	3	5M
		ii) Discuss the different services that the transport layer provides to the upper layers.	2	3	5M
5	Unit-IV				
	a	i) Compare and contrast Connectionless and Connection-Oriented Service	4	4	5M
		ii) Discuss about IPV4 header format	2	4	5M
	OR				
	b	Construct a routing table using the Distance Vector Routing algorithm and identify its limitations with examples.	3	4	10 M
6	Unit-V				
	a	Apply the CRC algorithm to detect errors in a given data sequence and illustrate the process with a step-by-step example	2	5	10 M
	OR				
	b	i) What is CSMA? Explain about CSMA/CD	3	5	5M
ii) Discuss about switch Ethernet and Gigabit Ethernet		2	5	5M	

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks
