

R20

III BTECH I SEM

END EXAMINATION QUESTION PAPERS

SUPPLEMENTARY

OCT./NOV. 2025

Subject Code: R20CC3101

III B.Tech. - I Semester Supple Examinations, October-2025 OPERATING SYSTEMS

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a Explain functions of operating systems.	2	1	7M
	Discuss various Operating Systems Structures	2	1	7M
	OR			
	b List the system calls and explain the use of these system calls.	2	1	7M
	Explain File management.	2	1	7M
2	Unit-II			
	a Draw and explain process state diagram.	2	2	7M
	Illustrate and explain Multi Thread programming models'.	2	2	7M
	OR			
	b Explain various CPU scheduling approaches and also discuss evaluation criteria for CPU scheduling.	3	2	14M
3	Unit-III			
	a What is semaphore? Explain Peterson's Solution with example	3	3	7M
	Illustrate with example Bounded buffer problem.	3	3	7M
	OR			
	b What are the necessary and sufficient conditions for occurrence of deadlock.	2	3	7M
	Explain Readers writers' problem. Illustrate with example.	2	3	7M
4	Unit-IV			
	a Explain Contiguous Memory Allocation with example.	3	4	7M
	What are the drawbacks of Contiguous Memory Allocation.? Explain with example.	2	4	7M
	OR			
	b Explain paging and also discuss internal fragmentation problem.	2	4	7M
	Explain the need of Hashed Page Tables with example.	2	4	7M
5	Unit-V			
	a What is Virtual Memory and also explain Demand Paging with example.	2	5	7M
	Explain any two page replacement algorithms with examples.	2	5	7M
	OR			
	b What are the necessary and sufficient conditions for occurrence of Deadlocks?	2	5	7M
	Explain file Access methods with examples.	2	5	7M

Subject Code: R20CC3102

III B.Tech. - I Semester Supple Examinations, October-2025

DATA WAREHOUSING AND DATA MINING

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a i) Define data mining and describe its significance in today's data-driven world.	2	1	7M
	ii) Discuss the origins of data mining and how they relate to modern techniques.	2	1	7M
	OR			
	b i) Identify and explain different types of data sets and their attributes in data mining.	2	1	7M
	ii) What are the common challenges faced in data mining applications? Provide examples.	2	1	7M
2	Unit-II			
	a i) Explain the importance of data preprocessing techniques in data mining. How do these techniques affect data analysis?	2	2	7M
	ii) Describe the process of dimensionality reduction and its impact on data mining tasks.	2	2	7M
	OR			
	b i) Compare different measures of similarity and dissimilarity, providing examples of how they are used in data mining.	2	2	14M
3	Unit-III			
	a i) What is a data warehouse? Discuss its role in data mining and its architecture.	2	3	7M
	ii) Explain the concept of OLAP and its significance in analyzing multidimensional data.	2	3	7M
	OR			
	b i) Compare star, snowflake, and fact constellation schemas in terms of their structure and use cases.	2	3	7M
	ii) Describe the steps involved in the design and construction of a data warehouse.	2	3	7M
4	Unit-IV			
	a i) Explain the decision tree induction process and how it can be used for classification tasks.	4	4	7M
	ii) Compare and contrast decision trees with the Bayesian classifier in terms of their approach to classification.	4	4	7M
	OR			
	b i) Discuss the problem of overfitting in classification models and how it can be mitigated.	4	4	7M
	ii) Evaluate the performance of classifiers using methods like cross-validation and bootstrap.	4	4	7M

5	Unit-V				
	a	i) Define association analysis and explain its importance in data mining.	4	5	7M
		ii) Discuss the Apriori algorithm for frequent item set generation. What are its strengths and limitations?	4	5	7M
	OR				
	b	i) Explain the FP-Growth algorithm and how it differs from the Apriori algorithm in generating frequent item sets.	4	5	7M
		ii) Compare different clustering algorithms (K-means, Agglomerative Hierarchical Clustering, DBSCAN) in terms of their strengths and weaknesses.	4	5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CC3103

III B.Tech. - I Semester Supple Examinations, October-2025

DESIGN AND ANALYSIS OF ALGORITHMS

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a Explain the process of algorithm specification and performance analysis with suitable examples.	K3	1	7M
	b Compare Time Complexity vs Space Complexity — explain how they affect algorithm performance and trade-offs.	K3	1	7M
	OR			
	b Discuss Big-O, Omega, and Theta notations with graphical representation and examples.	K3	1	14M
2	Unit-II			
	a Explain the working of Merge Sort algorithm using the Divide and Conquer strategy. Write its algorithm and analyze the time and space complexity.	K3	2	7M
	b Write and explain the algorithm for Binary Search using the Divide and Conquer technique. Derive its time complexity in best, average, and worst cases using recurrence relation.	K3	2	7M
	OR			
	b Explain the Strassen's Matrix Multiplication with example and derive its time complexity	K3	2	14M
3	Unit-III			
	a Explain the Greedy Method in algorithm design. Describe the general steps involved in this approach. Give one example where the greedy method can be applied successfully.	K3	3	7M
	b Describe the Job Sequencing with Deadlines problem using the Greedy method. Write the algorithm steps and explain with an example how profit is maximized.	K3	3	7M
	OR			
	b Using the Greedy approach, solve the Fractional Knapsack problem. Explain the algorithm and derive its time complexity.	K3	3	7M
	Explain the Single Source Shortest Path problem using Dijkstra's algorithm. Write the steps and illustrate with an example graph.	K3	3	7M
4	Unit-IV			
	a Explain the general method of Dynamic Programming. How does it differ from the Divide and Conquer approach? Illustrate the principle of optimality with an example.	K3	4	7M
	b Describe how Dynamic Programming is used to solve the All Pairs Shortest Path Problem using Floyd-Warshall algorithm. Write its algorithm and derive the time complexity.	K3	4	7M
	OR			
	b Explain the 0/1 Knapsack problem using Dynamic Programming. Write its recursive formula and compute the optimal profit for a given example.	K3	4	7M

		Explain the Matrix Chain Multiplication problem using Dynamic Programming. Derive its recursive relation and discuss how the optimal number of scalar multiplications is determined.	K3	5	7M
5	Unit-V				
		Explain the general method of Backtracking. Describe how the N-Queen problem can be solved using the backtracking approach.	K3	5	7M
	a	Describe how the Hamiltonian Cycle problems can be solved using Backtracking. Explain the algorithm steps and mention the criteria for feasible solutions.	K4	5	7M
	OR				
		Explain the Sum of Subsets problem using Backtracking.	K3	6	7M
	b	Explain the Branch and Bound method. Discuss how it can be applied to the 0/1 Knapsack problem	K4	6	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CC3104

III B.Tech. - I Semester Supple Examinations, October-2025 COMPUTER NETWORKS

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a What is the significance of layered architecture? Explain the OSI layered architecture with neat sketch.	2	2	7M
	Explain the following networks i) ARPANET ii) Internet	2	1	7M
	OR			
	b Compare and Contrast LAN,MAN and WAN	4	1	7M
	Explain TCP/IP reference model with a neat diagram	2	2	7M
2	Unit-II			
	a What is the significance of data link layer? Explain the design issues of data link layer.	2	3	7M
	Explain MAC sub layer protocol and frame structure of IEEE 802.11	2	3	7M
	OR			
	b Suppose we want to transmit the message 1011 0010 0100 1011 and protect it from errors using the CRC8 polynomial $x^8 + x^2 + x + 1$. (a) Use polynomial long division to determine the message that should be transmitted. (b) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? How does the receiver know that an error has occurred?	3	3	14M
3	Unit-III			
	a Explain the operation of the HDLC	2	4	7M
	What are the draw backs of stop and wait protocol? How can they overcome by sliding window protocol? Explain	2	4	7M
	OR			
	b Compare and Contrast pure aloha and slotted aloha.	4	4	7M
	What is CSMA with CD? What are the three different states a CSMA/CD can be in? Explain with a neat diagram.	2	4	7M
4	Unit-IV			
	a Explain the distance vector routing with example	2	5	7M
	Compare and Contrast Virtual Circuit Versus Datagram Subnets.	4	5	7M
	OR			
	b Compare and Contrast Connection Oriented and Connection Less Service	4	5	7M
	What is the format of IPv4 header? Describe the significance of each field. Also explain its different classes	2	5	7M
5	Unit-V			
	a Explain the mechanism of three way handshake protocol for TCP	2	6	7M
	Discuss the structure of TCP pseudo header and explain how it is used in checksum calculation	2	6	7M
	OR			
	b Explain the working of Electronic mail. How SMTP used in Email applications	2	6	7M
	How DNS service maps domain names to IP addresses. Explain	2	6	7M

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20CC3109

DEVOPS

R20

Time: 3 hours

CSE(AI&ML)

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Explain the importance of planning and Requirement analysis in the Software Development Life Cycle (SDLC).	K1	1	7M
	ii) Explain the principles of agile software.	K2	1	7M
	OR			
	b i) Analyse the testing types in Software Development Life Cycle (SDLC).	K4	1	7M
	ii) Explain the values of agile software.	K2	1	7M
2	Unit-II			
	a i) Explain about DevOps architecture.	K2	2	7M
	ii) Summarize the DevOps eco system	K2	2	7M
	OR			
	b i) Explain about DevOps Orchestration.	K2	2	7M
	ii) Analyse the DevOps delivery pipeline system.	K4	2	7M
3	Unit-III			
	a i) Presenting the DevOps adoption in projects to focus on Technology aspects.	K3	3	7M
	ii) Analyse the DevOps adoption in projects for Tool stack implementation.	K4	3	7M
	OR			
	b i) Analyse the DevOps adoption in Agiling capabilities with respective to projects.	K4	3	7M
	ii) Analyse the DevOps adoption in projects to focus on People aspects.	K4	3	7M
4	Unit-IV			
	a i) Explain about Continuous Delivery in DevOps.	K2	4	7M
	ii) Analyse the Metrics to track CICD practices.	K4	4	7M
	OR			
	b i) Explain about Continuous Integration in DevOps.	K2	4	7M
	ii) Measuring the Benefits of CI/CD.	K5	4	7M
5	Unit-V			
	a Determining the Key factors of DevOps maturity model	K3	5	14M
	OR			
	b Assesses the stages of DevOps maturity Model	K5	5	14M

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

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20CC3110 PRINCIPLES OF MACHINE LEARNING

Time: 3 hours

CSE(AI&ML,CS)

Max. Marks: 70

R20

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions								KL	C	M	
									O			
1	Unit-I											
	a	i) In your own words discuss how Machine Learning changing the problem solving approach? Explain any four application areas of Machine Learning								K4	C3	7M
		ii) Explain find –S algorithm with given example. Give its application. Table 1								K4	C3	7M
		Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport			
		1	Sunny	Warm	Normal	Strong	Warm	Same	Yes			
		2	Sunny	Warm	High	Strong	Warm	Same	Yes			
		3	Rainy	Cold	High	Strong	Warm	Change	No			
	4	Sunny	Warm	High	Strong	Cool	Change	Yes				
	OR											
	b	i) What do you mean by a well –posed learning problem? Explain the important features that are required to well –define a learning problem.								K4	C3	7M
ii) How is Candidate Elimination algorithm different from Find-S Algorithm								K4	C3	7M		
2	Unit-II											
	a	i) Give decision trees to represent the following boolean functions:								K3	C3	14M
		(a) $A \sim B$										
		(b) $A \vee [B \wedge C]$										
(c) $A \text{ XOR } B$												
(d) $[A \wedge B] \vee [C \wedge D]$												
OR												
b	i) Explain about ID3 algorithm with example								K3	C3	14M	
3	Unit-III											
	a	i) Given a dataset with 10,000 records, you train two hypotheses: Hypothesis A achieves 95% accuracy on training data but 80% on test data, while Hypothesis B achieves 90% accuracy on both training and test data. Analyze which hypothesis is better and explain why. Also, discuss how regularization might help in this scenario.								K4	C3	14M
		OR										
	b	i) How can the difference in error between two hypotheses be evaluated? Discuss various techniques to statistically compare two hypotheses								K4	C3	7M
		ii) Explain the methods used to estimate the accuracy of a hypothesis in supervised learning. Discuss the concepts of training error, generalization error, and validation techniques								K4	C3	7M

Unit-IV				
4	a	i) Define Probably Approximately Correct (PAC) learning and explain its significance in machine learning. What are the key conditions for a hypothesis class to be PAC-learnable?	K3	C3 7M
		ii) Derive the relationship between the VC dimension and the sample size required for probably approximately correct (PAC) learning. Use an example of a hypothesis class to illustrate how VC dimension is calculated and its implications on learning.	K3	C3 7M
	OR			
	b	i) Explain the concept of learning in the limit in the context of computational learning theory. Discuss how this model defines what it means for a learner to successfully learn a target function. Provide an example where a learner converges to the correct hypothesis in the limit, and discuss the limitations of this model in practical machine learning applications	K3	C3 14M
Unit-V				
5	a	i) Describe the Naive Bayes learning algorithm . Explain the key assumption of conditional independence in the Naive Bayes model. How is this assumption a simplification, and what are its implications for the algorithm's performance? Provide an example where Naive Bayes is used for text classification and walk through the steps involved in making a prediction.	K3	C3 7M
		ii) Derive the logistic sigmoid function and discuss how logistic regression models the probability of binary outcomes. How does logistic regression differ from linear regression? Provide an example problem and show how logistic regression is used to make a classification decision.	K3	C3 7M
	OR			
	b	i) Compare generative and discriminative models in machine learning. How do these models differ in terms of their approach to learning and prediction? Discuss the strengths and weaknesses of each approach, using Naive Bayes as an example of a generative model and logistic regression as an example of a discriminative model.	K3	C3 7M
		ii) Discuss the trade-offs between computational efficiency and classification accuracy in k-NN. Provide an example to show how the algorithm is applied to a classification problem.	K3	C3 7M

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



NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

Subject Code: R20CE3102

III B.Tech. - I Semester Supple Examinations, October-2025

SOIL MECHANICS

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	Explain Indian Standard soil classification system.	2	1	7M
	a A sample of clay was coated with paraffin wax and its mass, including the mass of wax, was found to be 697.5 g. The sample was immersed in water and the volume of the water displaced was found to be 355 ml. The mass of the sample without wax was 690 g, and the water content of the representative specimen was 18%. Determine the bulk density, dry density, void ratio and the degree of saturation. The specific gravity of the solids was 2.7 and that of the wax was 0.89.	3	1	7M
	OR			
	Discuss about the grain size distribution of soil by i) Sieve analysis ii) Sedimentation analysis	2	1	7M
2	b A soil mass in its natural state is partially saturated having a water content of 17.5 percent and void ratio of 0.87. Determine the degree of saturation, total unit weight, dry unit weight what is the weight of water required to make a mass of 10 m ³ volume to get saturated assume $G = 2.69$.	3	1	7M
	Unit-II			
	a Explain about various factors affecting co-efficient of permeability.	2	2	7M
	Elaborate about quick sand condition.	2	2	7M
3	OR			
	b The water table in a deposit of sand 8 m thick is at a depth of 3 m below the ground surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m ³ . Calculate the effective pressure at 1 m, 3 m and 8 m below the ground surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8 m.	3	2	14M
	Unit-III			
	a Define flow net. Draw a neat sketch. List the characteristics of flow nets.	2	3	7M
4	Illustrate the various uses of flow nets in engineering practices.	2	3	7M
	OR			
	b Describe the Newmark's influence chart and its applications.	2	3	7M
	Discuss in detail about the Boussinesq's analysis to find vertical stress and horizontal shear stress for point load.	2	3	7M
4	Unit-IV			
	a A clay layer of 8 m thick with single drainage settles by 120 mm in 2 years. The co-efficient of consolidation for this clay was found to be 6×10^{-3} cm ² /sec. Calculate the likely ultimate consolidation settlement and find out how long it will take to undergo 90% of this ultimate settlement.	3	4	7M
	Elucidate the laboratory determination of co-efficient of consolidation.	2	4	7M
	OR			

	b	A clay layer 4m thick is subjected to a pressure of 55 kN/m ² , if the layer has a double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take time factor as 0.196. If the coefficient of permeability is 0.02 m/year. Determine the settlement in one year.	3	4	7M
		Derive the equation for Terzaghi's theory of one-dimensional consolidation with a neat sketch.	3	4	7M
5	Unit-V				
	a	Explain the factors affecting compaction in detail.	2	5	7M
		Illustrate with a neat sketch the procedure of standard proctor compaction test.	2	5	7M
	OR				
	b	Describe the effects of compaction on various engineering properties of soils.	2	5	7M
		Enumerate the procedure of modified proctor compaction test.	2	5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

Subject Code: R20CE3103

III B.Tech - I Semester Supple Examinations, October-2025

HIGHWAY ENGINEERING

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

No.	Questions	KL	CO	Marks
Unit-I				
1	a What is master Plan? Explain the importance of master plan in highway planning?	K2	CO1	[7M]
	Explain the functional classification of highways as per Nagpur Plan.	K3	CO1	[7M]
	OR			
	b What are the factors controlling alignment of a highway?	K2	CO1	[7M]
	Give list of drawings to be submitted for highway alignment. Explain.	K2	CO1	[7M]
Unit-II				
2	a Discuss the design factors of horizontal alignment	K2	CO2	[7M]
	Calculate the safe stopping distance for design speed of 50kmph for two-way traffic on a two lane road. Assume coefficient of friction as 0.35 and reaction time of driver as 2.5seconds.	K2	CO2	[7M]
	OR			
	b Explain CBR and the test procedure for laboratory test.	K2	CO2	[7M]
	During aggregate crushing test on road aggregates, the weight of crushed aggregates retained on 2.36mm sieve is 400g. The original weight of aggregates is 500g. Determine the aggregate crushing value?	K2	CO2	[7M]
	During Los Angeles abrasion test on similar aggregates, the weight of powdered aggregates passing 1.70mm sieve is 1000g. The original weight of aggregates is 5kg. Determine the abrasion value?			
Unit-III				
3	a Draw a neat sketch of different types of intersections?	K3	CO3	[14M]
	OR			
	b What are the advantages of traffic signals?	K2	CO3	[7M]
	A pre-timed four phase signal has normal flow rates for the first three phases as 200, 187 and 210 veh/hr with saturation flow rates of 1800 veh/hr/lane for all phases. The lost time is given as 4 seconds for each phase. If the cycle length is 60 seconds. Using Webster's method, determine the effective green time of 4th phase?	K2	CO3	[7M]
Unit-IV				
4	a Write the design process of IRC method for flexible pavements?	K2	CO4	[7M]

		Briefly outline IRC recommendations for determining the thickness of CCpavement.	K2	CO4	[7M]
	OR				
		Write the difference between flexible pavement and rigid pavement?	K2	CO4	[7M]
	b	Compute the stresses due to wheel loads for the following data. Pavement thickness = 20cm, Wheel load = 4100kg, Radius of contact area = 18cm, Modulus of elasticity of concrete = $3 \times 10^5 \text{ kg/cm}^2$ Modulus of subgrade reaction = 5.4 kg/cm^3, Poisson's Ratio = 0.15.	K2	CO4	[7M]
Unit-V					
5	a	Discuss the various failures of flexible pavement.	K3	CO5	[14M]
	OR				
		Explain the importance of highway drainage in detail.	K3	CO5	[7M]
	b	Calculate the spacing between contraction joints for a two lane 250mm thick concrete road having 3.5m wide slab. Unit weight of concrete = 24 kN/m^3. Ultimate stress in tension = 0.16MPa. Coefficients of friction at interface = 1.5, and the factor of safety = 2. Also calculate the spacing between expansion joints, if the increase in temperature is 20°C, the expansion joint gap is 24mm and the thermal coefficient = $10 \times 10^{-6} \text{ per } ^\circ\text{C}$.	K2	CO5	[7M]

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

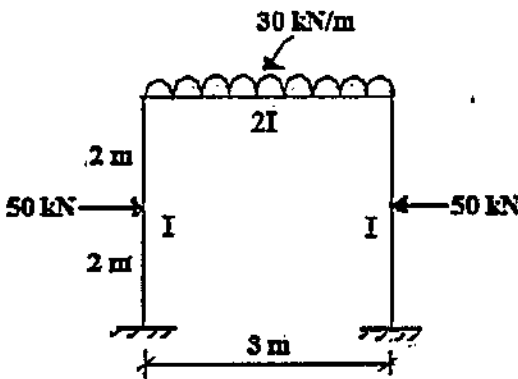
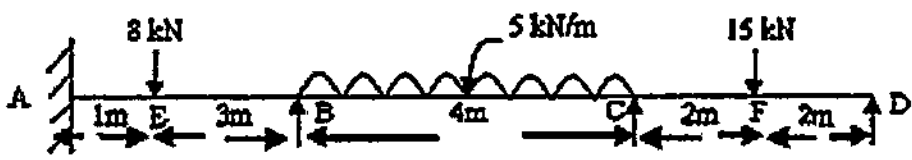
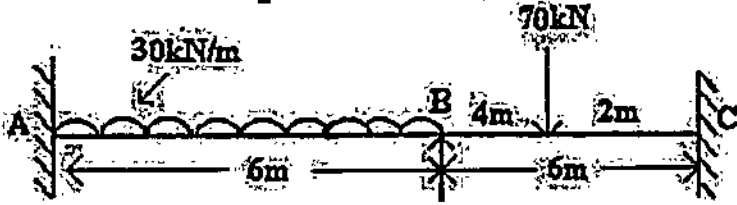
Subject Code: R20CE3104

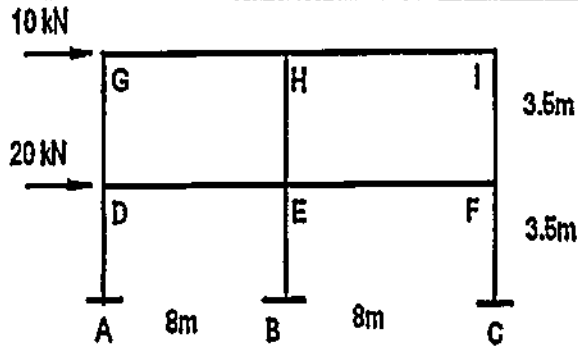
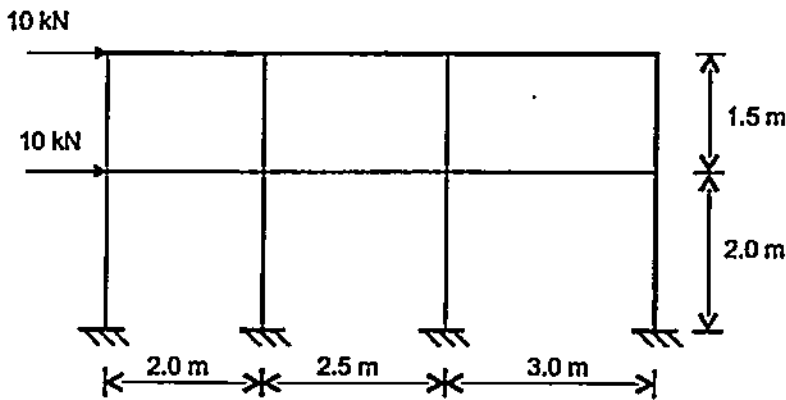
III B.Tech. - I Semester Supple Examinations, October-2025
ADVANCED STRUCTURAL ANALYSIS
(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

Q No	Questions	K L	CO	Marks
1	Unit-I			
	i) What is Castigliano's first theorem explain with an example?	K2	CO1	4M
	ii) Analyze the portal frame shown in Fig.1 by moment distribution method.	K4	CO1	10M
	 Fig.1			
	OR			
i) Derive the expression of strain energy due to axial load	K3	CO1	7M	
ii) Draw BMD for the Continuous beam shown in Fig.2 by using Moment Distribution method.	K4	CO1	7M	
 Fig.2				
Unit-II				
2	ii) Using Kani's method, analyse the two-span continuous beam loaded as shown in Fig.3, if the moment of inertia of span AB = 3 I, while that of BC= 2I.	K4	CO2	14M
	 Fig.3			
	OR			
	i) Explain Kani's method for frames with side sway.	K2	CO2	7M

		ii) Write the steps for analyzing a portal frame carrying a udl by Kani's method.	K2	CO2	7M
3	Unit-III				
		i) What is the effect of temperature on three hinged arch?	K3	CO3	4M
	a	ii) A three hinged parabolic arch rib has a span of 20 m and a rise 4m to the central point the crown. The rib carries load of intensity 2 kN/m uniformly distributed horizontally on the left 3 m. Calculate the maximum and minimum bending moments.	K3	CO3	10M
	OR				
	b	i) Find the horizontal thrust of a two hinged semi circular arch of radius R carries a concentrated load of W.	K3	CO3	5M
4		ii) A two hinged stiffened girder AB of span 100 m and central dip 10 m is subjected to two point loads 250 kN and 350 kN at 30 m and 70 m from left support respectively. Find Shear force and Bending moment at 35 m from left end.	K3	CO3	8M
	Unit-IV				
		Analyse the building frame shown in Fig.4 for Horizontal loads using Portal Frame Method. Draw the Shear and Bending diagrams.			
	a	 Fig.4	K4	CO4	14M
	OR				
		The steel jointed building frame shown in Fig.5 carries the lateral load as shown. Analyse the frame and draw the bending moment diagram using the cantilever method.			
	b	 Fig.5	K4	CO4	14M
	Unit-V				
		i) Give the types of significant cable structures	K3	CO5	4M
	a	ii) A cable is used to support six equal and equidistant loads over a span 14 m. The cable has central dip of 1.6 m. Find the length of the cable and sectional area required if safe tensile stress in cable material is 1.5 kN/cm ² .	K1	CO5	10M

OR				
5	b	i) Give examples of three hinged stiffened girder	K2	CO5 4M
		ii) A cable of span 120 m and dip 10 m carries a load of 6 kN/m of horizontal span. Find the maximum tension in the cable and the inclination of the cable at the support. Find the forces transmitted to the supporting pier if the cable passes over smooth pulleys on top of the pier. The anchor cable is at 30° to the horizontal. Determine the maximum bending moment for the pier if the height of the pier is 15 m.	K3	CO5 10M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CE3107

III B.Tech. - I Semester Supple Examinations, October-2025

SOLID WASTE AND HAZARDOUS MANAGEMENT

(CE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 =70M)

Q. No.	Questions	KL	CO	Marks
1	Unit-I			
	a Explain the various sources and types of municipal solid waste with suitable examples from residential and commercial sectors.	2	1	7M
	a Describe the functional elements of solid waste management and illustrate their inter-relationship in an integrated system.	2	1	7M
	OR			
	b Summarize the public health and environmental effects of improper disposal of solid wastes in urban areas.	2	1	7M
	b Interpret the factors affecting solid waste generation rates in different communities and their significance in waste management planning.	2	1	7M
2	Unit-II			
	a Apply route optimization techniques to design an efficient collection schedule for a municipal area with varying population densities.	3	2	7M
	a Demonstrate the use of different compaction methods to reduce the volume of solid waste during transfer operations.	3	2	7M
	OR			
	b Utilize unit operations for separation and transformation of solid waste at a materials recovery facility.	3	2	14M
3	Unit-III			
	a Apply shredding and material separation techniques to recover valuable materials from mixed municipal solid waste.	3	3	7M
	a Demonstrate the composting process for treating organic fraction of solid waste including process parameters and conditions.	3	3	7M
	OR			
	b Implement source reduction and waste minimization strategies in an industrial manufacturing unit.	3	3	7M
	b Illustrate the incineration process for solid waste treatment including mass and energy balance calculations.	3	3	7M
4	Unit-IV			
	a Analyze the site selection criteria for sanitary landfills considering geological, hydrological, and environmental factors.	4	4	7M
	a Examine the methods of operation of sanitary landfills and evaluate their advantages and disadvantages for specific scenarios.	4	4	7M
	OR			
	b Compare the chemical and biological reactions occurring in completed landfills and their influence on gas composition.	4	4	7M
	b Investigate leachate generation, movement, and control mechanisms in sanitary landfills with different liner configurations.	4	4	7M
5	Unit-V			
	a Analyze the characterization methods for hazardous waste including compatibility testing and flammability assessment procedures.	4	5	7M
	a Examine the fate and transport mechanisms of hazardous chemicals in environmental media and their associated health effects.	4	5	7M
	OR			
	b Compare different collection, treatment, and disposal methods for biomedical wastes based on waste category and infection risk.	4	5	7M
	b Differentiate between the sources, classification, and disposal requirements of various levels of radioactive wastes.	4	5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20EE3101

III B.Tech. - I Semester Supple Examinations, October-2025

PROBLEM SOLVING WITH PYTHON

(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	K L	CO	Marks
1	Unit-I			
	a Explain the concept of divide and conquer with a suitable example. Discuss its advantages and disadvantages.	K2	CO1	7M
	Explain the Von Neumann architecture with a neat diagram. Discuss its key components and their functions.	K3	CO1	7M
	OR			
	b Write an algorithm to implement a binary search	K4	CO1	7M
2	Convert the decimal numbers 123 and 4567 into its binary equivalent.	K3	CO1	7M
	Unit-II			
	a Write a Python program to implement basic arithmetic operations (addition, subtraction, multiplication, and division).	K3	CO2	7M
	Design and implement a Python program to generate a Fibonacci series	K4	CO2	7M
	OR			
	b Write a Python program that takes a string as input and performs the following operations: 1. Reverses the string. 2. Counts the number of vowels and consonants. 3. Removes all punctuation marks. 4. Converts the string to uppercase and lowercase.	K3	CO2	14M
3	Unit-III			
	a Explain the concept of inheritance and polymorphism in Python.	K4	CO3	7M
	Demonstrate how polymorphism can be used to create a list of different car types (e.g., Car, ElectricCar, HybridCar) and call a common method like start() on each object.	K4	CO3	7M
	OR			
	b Differentiate between instance methods, class methods, and static methods in Python.	K2	CO3	7M
4	Explain the concept of operator overloading in Python.	K1	CO3	7M
	Unit-IV			
	a Explain list comprehension with suitable examples.	K2	CO4	7M
	Write a Python program to create a list of squares of numbers from 1 to 20 using list comprehension.	K2	CO4	7M
	OR			
	b What is meant by immutability in tuples?	K2	CO4	7M
	Explain the advantages and disadvantages of tuple immutability.	K2	CO4	7M

Unit-V				
5	a	Explain the following set operations with examples: 1. Union 2. Intersection 3. Difference 4. Symmetric Difference	K3	CO5 7M
		Write a Python code snippet to demonstrate the use of inheritance and polymorphism to create a hierarchy of shapes (e.g., Circle, Rectangle, Square) and calculate their areas.	K4	CO5 7M
	OR			
	b	Provide a practical example of how abstract classes and interfaces can be used to design a flexible framework for a banking system.	K5	CO5 7M
		Explain the purpose of exception handling in Python.	K2	CO5 7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20EE3102

III B.Tech. - I Semester Supple Examinations, October-2025

POWER ELECTRONICS

(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	M
1	Unit-I			
	Describe the dynamic and gate characteristics of an SCR. Why is the gate current significant in controlling the operation of the SCR?	K2	1	7M
	a Discuss the different triggering methods for SCR. How do these methods impact the device's response time and reliability in high-power applications?	K3	1	7M
	OR			
	Demonstrate how a snubber circuit works to protect power electronic devices, such as SCRs, from voltage spikes. Provide a diagram and explain its components and working principles.	K3	1	7M
2	b Evaluate the gate characteristics of an IGBT in comparison to a MOSFET. How do these characteristics impact the switching behavior of the device?	K2	1	7M
	Unit-II			
	a Explain the operation of a single-phase full-bridge converter with RL load. Draw the waveforms for input voltage, output voltage, and output current when the firing angle is $\alpha=60^\circ$.	K2	2	7M
	ii). A single-phase half-wave-controlled rectifier with $R=15\Omega$ is supplied from a 220V, 50Hz AC supply. If the average load current is 8A, determine the firing angle and the average DC output voltage.	K3	2	7M
	OR			
3	b Trace and explain the input and output voltage waveforms for a single-phase fully controlled converter with R-load when the firing angle is $\alpha=75^\circ$. Justify how the firing angle affects the power factor of the converter.	K3	2	7M
	ii) A fully controlled bridge converter operates with an RL load and a back EMF of 100V. Determine the average DC output voltage when the firing angle is $\alpha=45^\circ$ and input voltage is 230V, 50Hz.	K2	2	7M
	Unit-III			
3	a i) Explain the working of a three-phase fully controlled bridge converter. Draw the output voltage waveform for $\alpha=60^\circ$ with a purely resistive load.	K2	3	7M
	ii) A three-phase half-controlled rectifier is connected to an RL load with a resistance of 10Ω and inductance of 50 mH. If the firing angle is $\alpha=90^\circ$, calculate the average output voltage and current.	K3	3	7M
	OR			

Subject Code: R20EE3107

III B.Tech. - I Semester Supple Examinations, October-2025

SIGNALS AND SYSTEMS

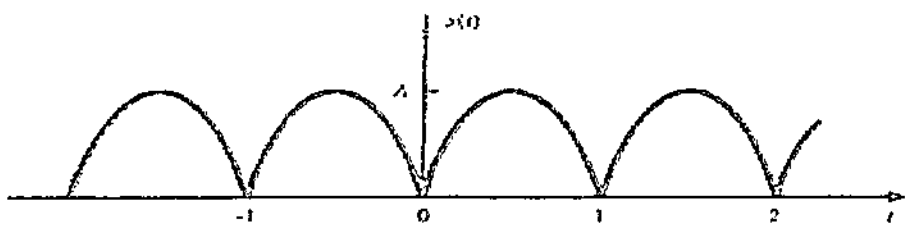
(EEE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	K L	CO	Marks
1	Unit-I			
	i)Examine whether each of the following sequences are periodic or not. If periodic, determine the fundamental period $i) x(t)=j e^{j 5 t}$ $ii) x(t)=2 u(t)+2 \sin 2 t$ $iii) x(n)=e^{j \frac{2 \pi}{3} n}+e^{j \frac{3 \pi}{4} n}$	K3	1	6M
	ii)Determine whether the signals are energy signal or a power signal and calculate their energy or power $i) x(n)=\left(\frac{1}{3}\right)^n u(n)$ $ii) x(t)=10 \cos 5 t \cos 10 t$	K3	1	8M
	OR			
	Sketch i) $x(2 t+1)$ ii) $[x(t)+x(-t)] u(t)$ iii) $x(2-t)$ for the given $x(t)$	K3	1	7M
	Test whether each of the following sequences are periodic or not. If periodic, determine the fundamental period $i) 2 \cos 50 \pi t+3 \sin 25 \pi t$ ii) $\sin \frac{4 \pi n}{3}+\cos \frac{2 \pi n}{3}$	K5	1	7M
2	Unit-II			
	Determine the Trigonometric Fourier Series Representation of:	K3	2	8M
	i) List out Dirichlet conditions of Fourier series. ii) State and prove any three properties of Fourier series	K4	2	6M
	OR			
b	i) Determine the exponential Fourier series expansion of the following	K5	2	14M

		signal $x(t)$ 			
		ii) Explain any four properties of Fourier series.			
3	Unit-III				
	a	Solve the Fourier transform of the given signals i) $x(t) = e^{-3t}[u(t+2) - u(t-3)]$ ii) $x(t) = \cos(\omega_0 t)u(t)$	K5	3	7M
		Solve the Fourier transform rectangular function.	K3	3	7M
	OR				
	b	Deduce the convolution of $x_1(t) = e^{-2t}u(t)$ and $x_2(t) = e^{-6t}u(t)$ using Fourier Transform.	K4	3	7M
4		List out and prove shifting and differentiation properties in time and frequency domain.	K4	3	7M
	Unit-IV				
	a	Check whether the following systems are: i) Linear or non-linear ii) Static or dynamic iii) Causal or non-causal iv) Time-invariant or time-variant 1) $\frac{d^2 y(t)}{dt^2} + 2y(t)\frac{dy(t)}{dt} + 3ty(t) = x(t)$ 2) $y(t) = at^2x(t) + bt x(t-4)$	K5	4	8M
		Find the transfer function for the given system described by the difference equation $y[n] = y[n-1] - \frac{1}{2}y[n-2] + x[n] + x[n-1]$	K3	4	6M
	OR				
	b	Solve the frequency response $H(e^{j\omega})$ for the system a causal and stable LTI system whose input $x(n)$ and output $y(n)$ are related through the second order difference equation $y[n] - \frac{3}{2}y[n-1] + \frac{1}{2}y[n-2] = x[n]$ for $n \geq 0$	K5	4	7M
5		Discuss different ideal filter characteristics	K3	4	7M
	Unit-V				
	a	Explain the Nyquist Sampling Theorem. Discuss its significance in signal processing, including the conditions necessary for perfect reconstruction of a signal from its samples.	K4	5	7M
		A continuous signal $x(t) = 5\sin(2000\pi t) + 3\cos(4000\pi t)$ is to be sampled. a) Determine the minimum sampling frequency according to the Sampling Theorem. b) If the signal is sampled at 5000 Hz, discuss whether aliasing will occur.	K3	5	7M
	OR				
	b	i) Discuss, Compare and contrast different types of sampling	K3	5	8M
		ii) Discuss Nyquist rate and Nyquist interval for the following signal $x(t) = 5\cos(2\pi 3000t) + 3\cos(2\pi 7000t)$	K3	5	6M

Subject Code: R20ME3101

III B.Tech. - I Semester Supple Examinations, October-2025 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No.	Questions	Marks	CO	K L
	Unit-I			
1	a Explain the significant challenges in AI problem-solving. Provide examples of real-world AI problems and discuss how AI systems address these challenges.	[14M]	CO1	K3
	OR			
	b Examine the nature of environments in AI. How do different types of environments (e.g., deterministic, stochastic) influence the design of intelligent agents?	[14M]	CO1	K2
	Unit-II			
2	a i) Discuss Uniform Cost Search (UCS). How does UCS differ from BFS, and why is it optimal in specific scenarios? ii) <u>Explain</u> the efficiency of the BFS algorithm in problem-solving.	[7M] [7M]	CO2 CO2	K3 K3
	OR			
	b What is the optimality of A* Search? Under what conditions can A* guarantee an optimal solution, and how does the heuristic choice affect this?	[14M]	CO2	K4
	Unit-III			
3	a <u>Illustrate</u> with examples of different types of knowledge representation in AI.	[14M]	CO3	K4
	OR			
	b What is Logic Programming in AI? Explain how languages like Prolog are used in logic programming and discuss their applications in AI problem-solving.	[14M]	CO3	K2
	Unit-IV			
4	a i) Explain the concept of clustering in unsupervised learning. How does clustering differ from classification ii) Explain the types of problems that can be solved using supervised learning	[7M] [7M]	CO4	K3 K3
	OR			
	b i) <u>Discuss</u> the concept of Clustering used in ML. ii) Define machine learning and explain why it is needed in modern computing.	[7M] [7M]	CO4	K2 K2
	Unit-V			
5	a Describe the K-Nearest Neighbors (KNN) algorithm. How does it work, and what are its advantages and limitations in classification tasks?	[14M]	CO5	K3
	OR			
	b Discuss the Random Forest algorithm. How does it improve over a single decision tree, and what are its advantages and disadvantages regarding performance and interpretability?	[14M]	CO5	K4

Subject Code: R20ME3102

III B.Tech. - I Semester Supple Examinations, October-2025

HEAT POWER ENGINEERING

(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks	
1	Unit-I				
	a	Explain the layout of steam power plant with neat sketches	K2	CO1	7M
		How the regeneration improves the performance of steam power plant?	K2	CO1	7M
	OR				
	b	Write notes on different types of fuels, how the quality of fuels can be assessed?	K2	CO1	7M
		What is volumetric analysis of gases? Explain Orsat apparatus with neat sketches.	K2	CO1	7M
2	Unit-II				
	a	Differentiate between boiler mountings and accessories and list a few.	K2	CO2	7M
		Discuss with neat sketches 'Equivalent Evaporation of the Boiler'.	K2	CO2	7M
	OR				
	b	What are the various types of draught systems in boilers? Explain.	K2	CO2	14M
3	Unit-III				
	a	Steam issues from a nozzle at 800 m/s. The velocity of moving blade is 200 m/s and the mass of steam flow is 2 kg/s. The nozzles are inclined at 16° to the plane of the wheel; taking friction factor as 0.8 and outlet angle of blade as 30°. Find (a) power developed, (b) the blade angle at inlet, (c) the blade efficiency and (d) axial thrust.	K3	CO3	14M
	OR				
	b	List various types of Steam Nozzles and explain one of them briefly.	K2	CO3	7M
		Determine the diameters of throat and exit for a steam nozzle to convey 10 kg/min where the inlet conditions are 12 bar and 250 °C and the final pressure is 2 bar. Neglect initial velocity of steam and effect of friction.	K3	CO3	7M
4	Unit-IV				
	a	What is a turbine? How are the steam turbines classified?	K3	CO4	7M
		Find the maximum efficiency and optimum blade speed ratio of a De-Laval turbine where the nozzle angle is 20°	K3	CO4	7M
	OR				
	b	In an impulse turbine the nozzle delivers 25 kg of steam per second. The nozzle angle is 150. The steam issues from the nozzle with a velocity of 900 m/s. The blade velocity is 350 m/s. The inlet and outlet angles of the blades are equal. Neglecting friction, calculate (a) The blade angles (b) developed and (c) diagram efficiency.	K4	CO4	14 M

5

Unit-V				
a	Write the assumptions for open cycle gas turbine plant and derive the efficiency for it.	K3	CO5	7M
	Discuss the working of Gas Turbine power plant? Compare the open cycle and Closed cycle Gas Turbine power plant.	K2	CO5	7M
OR				
b	Explain the classification of Rockets used in Industry.	K2	CO5	7M
	A turbojet engine uses aviation kerosene, if the mass flow rate of the fuel and mass flow rate of air is 0.45 kg/s and 32 kg/s respectively and the forward velocity is 500 m/s and thrust produced is 12 KN. Calculate the Jet velocity and Thrust power considering fuel-air ratio, also find the calorific value of the fuel, if the heat added is 20 MW.	K4	CO5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20ME3103

III B.Tech. - I Semester Supple Examinations, October-2025

DESIGN OF MACHINE ELEMENTS-I

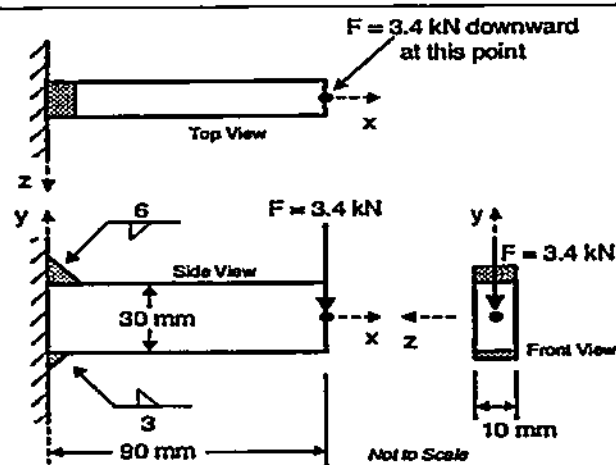
(ME)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

QNo		Questions	KL	CO	Marks
1	Unit-I				
	a	Discuss the importance of each step and the role of analysis and optimization in the design process.	K3	CO1	7M
		Define tolerance, allowance, and fit in the context of machine design	K3	CO1	7M
	OR				
	b	Define stress and strain, and differentiate between normal and shear stress and strain. Derive the stress-strain curve for a ductile material and explain its various stages.	K3	CO1	7M
2		A steel rod of 20 mm diameter is subjected to an axial tensile load of 50 kN. Calculate the stress and strain in the rod if the modulus of elasticity of steel is 200 GPa.	K4	CO1	7M
	Unit-II				
	a	A steel component is subjected to a cyclic stress of ± 100 MPa. The ultimate tensile strength of the material is 600 MPa, and the endurance limit is 300 MPa. Determine the fatigue life of the component using the modified Goodman diagram.	K4	CO2	14M
	OR				
3		Explain the Maximum Principal Stress Theory, Maximum Shear Stress Theory, and von Mises-Hencky Theory.	K2	CO2	7M
	b	A simply supported beam of span 4 m carries a uniformly distributed load of 20 kN/m. If the beam has a rectangular cross-section of 200 mm $\times$ 300 mm, determine the maximum bending stress and shear stress in the beam.	K4	CO2	7M
3	Unit-III				
	a	Design a single riveted lap joint to connect two plates of 10 mm thickness. The tensile force acting on the joint is 50 kN. Assume suitable values for the allowable stresses in tension, shear, and bearing. Determine the rivet diameter, pitch, and efficiency of the joint.	K6	CO3	7M
		A double riveted lap joint is designed with a pitch of 75 mm and a rivet diameter of 20 mm. The thickness of the plates is 10 mm. The allowable stresses in tension, shear, and bearing are 100 MPa, 80 MPa, and 150 MPa, respectively. Determine the efficiency of the joint.	K5	CO3	7M
	OR				
	b	A cantilever beam of length 2 m is welded to a vertical wall using two fillet welds, each of 10 mm leg size. The beam carries a uniformly distributed load of 20 kN/m. Determine the required length of the weld to avoid failure in shear. Assume the allowable shear stress in the weld metal is 100 MPa.	K5	CO3	14M



Unit-IV

4	a	Explain the different types of keys with neat sketches. Discuss the advantages and disadvantages of each type.	K3	CO4	7M
	a	A shaft is subjected to a bending moment of 1000 Nm and a twisting moment of 1500 Nm. Design a square parallel key for this shaft. Assume suitable values for allowable shear and crushing stresses.	K5	CO4	7M
	OR				
	b	What are the different types of cotter joints? Explain the design considerations for a socket and spigot cotter joint. With Neat Sketches and Required Formulae.	K4	CO4	14M
5	Unit-V				
	a	A solid circular shaft is subjected to a torque of 1000 Nm. The shaft material has an allowable shear stress of 80 MPa. Determine the minimum diameter of the shaft.	K3	CO5	14M
	OR				
	b	A solid circular shaft is subjected to a bending moment of 300 Nm and a torque of 400 Nm. The material of the shaft has an allowable tensile stress of 100 MPa and an allowable shear stress of 80 MPa. Determine the minimum diameter of the shaft using the maximum shear stress theory.	K6	CO5	14M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

NEC ENGINEERING COLLEGE

(AUTONOMOUS)

Subject Code: R20EC3101

III B.Tech. - I Semester Supple Examinations, October-2025

LINEAR & DIGITAL IC APPLICATIONS

(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions. All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a i) Explain internal block diagram of operational amplifier.	II	1	7M
	ii) Develop output voltage equations for Integrator and Differentiator.	III	1	7M
	OR			
	b i) Explain DC and AC characteristics of an operational amplifier.	II	1	7M
	ii) Write short notes on Pole-Zero Compensation and Feed-Forward Compensation.	III	1	7M
2	Unit-II			
	a i) Explain binary weighted resistor DAC.	II	2	7M
	ii) Draw and explain the schematic diagram of IC 555 in astable mode.	III	2	7M
	OR			
	b i) Explain successive approximation ADC.	II	2	7M
	ii) Explain Flash or Parallel compactor type ADC.	II	2	7M
3	Unit-III			
	a i) Develop the voltage gain equations for LPF and HPF.	III	3	7M
	ii) Explain principle of operation of PLL(IC-565)	II	3	7M
	OR			
	b i) Compare Narrow BPF and Narrow BRF.	IV	3	7M
	ii) Explain the principle of operation of Voltage Controlled Oscillator (VCO) - IC 566.	II	3	7M
4	Unit-IV			
	a i) Develop AND gate using CMOS logic.	III	4	7M
	ii) Develop inverter circuit using emitter coupled logic.	III	4	7M
	OR			
	b i) Develop NOR gate using CMOS logic.	III	4	7M
	ii) Compare of CMOS, TTL and ECL logics.	IV	4	7M
5	Unit-V			
	a i) Develop 32 to 1 Multiplexer using 8 to 1 Multiplexers.	III	5	7M
	ii) Build Floating-Point Encoder.	III	5	7M
	OR			
	b i) Develop 4 to 16 decoder using 3 to 8 decoders.	III	5	7M
	ii) Compare bi- directional shift register and universal shift register.	IV	5	7M

Subject Code: R20EC3102

III B.Tech. - I Semester Supple Examinations, October-2025

ANTENNAS AND WAVE PROPAGATION

(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
Unit-I				
1	i) Define the following with proper equation: a) Beam Width, Beam Area and Beam Efficiency, b) Gain, Directivity and polarization.	K1	1	10M
	ii) Illustrate the significance of radiation resistance of an antenna?	K4	1	4M
	OR			
	i) The radiated intensity of a particular antenna is $U = \sin^2 \theta$. Calculate the directivity of the antenna	K4	1	10M
2	ii) Summarize about ' θ ' and ' ϕ ' of a antenna radiation pattern.	K2	1	4M
	Unit-II			
	i) How a dipole antenna can be formed from two wire open circuit transmission line.	K6	2	7M
	ii) Calculate the radiation resistance of a $\lambda/16$ and $\lambda/4$ wire dipoles in free space.	K4	2	7M
3	OR			
	b) Prove that the radiation resistance of half wave dipole antenna is 73ohm.	K5	2	14M
	Unit-III			
	i) Explain in detail about Broadside and End-fire arrays.	K2	3	9M
4	ii) A broadside array operating at 100 cm wavelength consists of four half wave dipoles spaced 50 cm. Each element carries radio frequency current in the same phase and magnitude 0.5 Amp. Determine the radiated power.	K3	3	5M
	OR			
	i) For an N-element uniform linear array, derive an expression for the array factor.	K3	3	7M
	ii) Explain in detail about Binomial arrays.	K4	3	7M
5	Unit-IV			
	i) With a neat sketch explain the operation of Yagi-Uda array.	K3	4	7M
	ii) Design a Yagi-Uda antenna at frequency 200 MHz and Number of Elements are 5.	K6	4	7M
	OR			
	i) Describe the method of measuring the gain and radiation pattern of an antenna.	K5	4	7M
5	ii) Explain the working principal of parabolic reflector antenna	K2	4	7M
	Unit-V			
	i) Describe the characteristics of Ground wave Propagation	K2	5	7M
	ii) Explain wave tilt effect in ground wave propagation	K2	5	7M
5	OR			
	Define the following terms: (a) Critical frequency (b) MUF (c) Skip Distance (d) Virtual height	K1	5	7M
	Derive the expressions for phase velocity and group velocity of sky wave.	K3	5	7M

Subject Code: R20EC3103

III B.Tech. - I Semester Supple Examinations, October-2025

DIGITAL SIGNAL PROCESSING

(ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a Determine the energy and power of the given signal $x(t) = t u(t)$	III	1	7M
	Check whether the given system is linear or not $y(t) = x^2(t)$	III	1	7M
	OR			
	b The DTFT of a discrete time signal $x(n)$ is given as $X(e^{j\omega}) = 2e^{2j\omega} + 3 + 4e^{-j\omega} - 2e^{-2j\omega}$. Find the impulse response $h(n)$.	III	1	7M
2	Sketch the following signals (i) $u(-t+2)$, (ii) $r(-t+3)$	II	1	7M
	Unit-II			
	a Find the DFT of the signal $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$	IV	2	14M
3	OR			
	b Compute $X(k)$ of $x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$ using radix-2 DIT FFT. Also plot amplitude and frequency spectra.	IV	2	14M
	Unit-III			
4	a Obtain the cascade and parallel realization of the following filter structure using direct form II	IV	3	14M
	$H(z) = \frac{(3+5z^{-1})(0.6+3z^{-1})}{(1+5z^{-1}+2z^{-2})(1+z^{-1})}$			
	OR			
5	b Explain lattice structure with one example.	II	3	7M
	Given $H(z) = 0.5 + 0.25z^{-1} + 0.75z^{-2} + z^{-3} + 0.75z^{-4} + 0.25z^{-5} + 0.5z^{-6}$. Draw the linear phase realization and direct form realization and compare both the structures.	III	3	7M
	Unit-IV			
6	a Design a digital Butterworth filter satisfying the constraints with $T=1$ using Bilinear transformation.	IV	4	14M
	$0.707 \leq H(e^{j\omega}) \leq 1$ for $0 \leq \omega \leq \pi/2$ $ H(e^{j\omega}) \leq 0.2$ for $3\pi/4 \leq \omega \leq \pi$			
	OR			
7	The specification of the desired low pass digital filter is $0.8 \leq H(e^{j\omega}) \leq 1$ for $0 \leq \omega \leq 0.2\pi$ $ H(e^{j\omega}) \leq 0.4$ for $0.6\pi \leq \omega \leq \pi$ Design a Chebyshev digital filter issuing impulse invariant method with $T=1$.	IV	4	14M
	Unit-V			
	a Design an ideal Hilbert transformer having frequency response, Using Rectangular window for $N=11$.	IV	5	14M

		$H_d(e^{j\omega}) = j$ for $-\pi \leq \omega \leq 0$ $-j$ for $0 \leq \omega \leq \pi$			
	OR				
	b	Using frequency sampling method design a low pass filter with cut off frequency, $\omega_c = \pi/4$ and $N=15$ and plot the magnitude response.	IV	5	14M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

NEC ENGINEERING COLLEGE (AUTONOMOUS)

Subject Code: R20EC3106

III B.Tech. - I Semester Supple Examinations, October-2025 ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.
All Questions Carry Equal Marks (5 X 14 =70M)

QN o	Questions	K1	CO	Marks
1	Unit-I			
	a (i) Explain the functional elements of the measurement system with a neat block diagram.	K2	CO1	7M
	a (ii) A circuit was tuned for resonance by six different students, and the values of resonant frequency in KHz were recorded as 534, 648, 588, 577, 640, and 545. Calculate a) Mean and b) Average deviation.	K3	CO1	7M
	OR			
	b (i) Classify and explain the different errors of measurement.	K1	CO1	7M
	b (ii) Explain the following terms in detail: Accuracy, Resolution, Precision, Fidelity.	K4	CO1	7M
2	Unit-II			
	a (i) Explain in detail the principle, workings, and features of LVDT with a neat sketch.	K3	CO2	7M
	a (ii) Short notes: Strain Gauge.	K1	CO2	7M
	OR			
	b (i) Explain how to measure pressure using a capacitive-type transducer.	K3	CO2	7M
	b (ii) Compare NTC and PTC thermistors in terms of material, application, and response.	K2	CO2	7M
3	Unit-III			
	a (i) Explain the working principle of the Wien Bridge with a neat diagram.	K1	CO3	7M
	a (ii) A PMMC ammeter gives a reading of 40 mA when connected across two opposite corners of a bridge rectifier, the other two corners of which are connected in series with a capacitor to a 10 K, 50 Hz supply. Determine the capacitance.	K3	CO3	7M
	OR			
	b (i) Explain Wheat stone bridge with a neat diagram in detail.	K1	CO3	7M
	b (ii) Draw the Anderson Bridge and derive the expression for the unknown inductance. Write down the salient features of this bridge.	K3	CO3	7M
4	Unit-IV			
	a (i) What is Heterodyning? Explain the use of Heterodyning in a spectrum analyzer, along with its circuit diagram.	K3	CO4	7M
	a (ii) Short notes: Data acquisition system.	K1	CO4	7M
	OR			
	b (i) Define a wave analyzer and classify them. Explain the working of a Resonant Wave Analyzer.	K1	CO4	7M
	b (ii) A dual-slope integrating DVM uses an integration (charge) time $T_{int}=200$ ms. The reference used during de-integration is $V_{ref}=1.000$ V. If the	K4	CO4	7M

		unknown DC input is $V_{in}=2.345$ V, compute the de-integration time T_{dc} . Also state the total conversion time.			
5	Unit-V				
	a	(i) With a neat diagram, explain the basic components and working principles of magnetic tape recorders.	K2	CO5	7M
		(ii) Write short notes on CRO	K1	CO5	7M
	OR				
	b	(i) Write a detailed technical note on the Dot Matrix display.	K1	CO5	7M
		(ii) Draw the block diagram X-Y recorder and explain	K2	CO5	7M

KL: Bloom's Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

Subject Code: R20CS3105

III B.Tech. - I Semester Supple Examinations, October-2025

COMPILER DESIGN

(CSE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	A i. With neat diagram explaining different phases of compiler. Mention the input and output of each phase.	K3	CO1	7M
	ii. Discuss about the role of lexical analyzer. Why separating lexical analyzer from the syntax analyzer?	K2	CO1	7M
	OR			
	B i. Write regular expressions & FA for the following informally described languages: a. All strings of a's and b's with the subsequence abb. b. All strings of a's and b's with an even number of a's and an odd number of b's.	K3	CO1	7M
2	ii. Derive the regular expression for the tokens given below and draw a transition diagram to recognize the following tokens: a. Relational operators b. Integer constant c. Identifier	K4	CO1	7M
	Unit-II			
	i. What is Left Recursion? Explain the procedure to eliminate Left Recursion with an example.	K3	CO2	7M
	ii. Consider the following grammar $S \rightarrow (L) a$ $L \rightarrow L, S S$ Construct leftmost and rightmost derivations and parse trees for the following sentences: i. (a,(a,a)) ii. (a,((a,a),(a,a))).	K4	CO2	7M
	OR			
	b i. Verify whether the following grammar is LL(1) or not? $E \rightarrow E + T T$ $T \rightarrow T * F F$ $F \rightarrow (F) a b.$	K3	CO2	7M
3	ii. Illustrate FIRST and FOLLOW for the following grammar. $E \rightarrow TE'$ $E' \rightarrow +TE' \epsilon$ $T \rightarrow FT'$ $T' \rightarrow *FT' \epsilon$ $F \rightarrow (E) id$	K3	CO2	7M
	Unit-III			
	a i. Show that the following grammar is CLR(1) but not LALR(1) $S \rightarrow Aa bAc Bc bBa$ $A \rightarrow d$ $B \rightarrow d$	K4	CO3	9M
	ii. Differentiate Top-down and Bottom-up Parsers?	K3	CO3	5M
	OR			

	b	i. Construct an SLR parsing table for the grammar G: $S \rightarrow L=R \mid R$ $L \rightarrow *R \mid id$ $R \rightarrow L$ Is it SLR(1) grammar? or not?	K4	CO3	9M
		ii. Explain about SR and RR conflicts of shift reduce parsers with an example.	K3	CO3	5M
4	Unit-IV				
	a	i. What is an Intermediate Code form? Analyze the quadruples, triples and indirect triple representations for the expression: $a = b * -c + b * -c$	K3	CO4	9M
		ii. Construct Syntax tree to evaluate the expression $int\ a,b,c;$ through SDD using the following grammar: $S \rightarrow TL;$ $T \rightarrow int$ $T \rightarrow float$ $T \rightarrow char$ $T \rightarrow double$ $L \rightarrow L, id$ $L \rightarrow id$	K4	CO4	5M
	OR				
	b	i. Discuss various storage allocation techniques.	K4	CO4	7M
		ii. Explain synthesized and inherited attributes with an example.	K3	CO4	7M
5	Unit-V				
	a	i. Explain about register allocation and assignment in target code generation.	K2	CO5	7M
		ii. What is Code Optimization? Analyze the following Machine Independent Code Optimization (Function preserving) techniques: • Common sub-expression elimination • Copy Propagation • Dead Code elimination	K4	CO5	7M
	OR				
	b	i. Explain basic block and flow graph with a suitable example of three address code representation?	K2	CO5	7M
		ii. Analyze Peephole Optimization techniques.	K4	CO5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

Subject Code: R20IT3103

III B.Tech. - I Semester Supple Examinations, October-2025

AUTOMATA AND COMPILER DESIGN

(IT)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks																
1	Unit-I																			
	a	i)Construct a Deterministic Finite State Automata equivalent to the NFA given below $M=\{(q_0,q_1,q_2,q_3), \{0,1\}, \delta, q_0, \{q_3\}\}$ where δ is defined by the following transition table <table><tr><td>δ</td><td>0</td><td>1</td></tr><tr><td>q_0</td><td>(q_0,q_1)</td><td>(q_0)</td></tr><tr><td>q_1</td><td>(q_2)</td><td>(q_1)</td></tr><tr><td>q_2</td><td>(q_3)</td><td>(q_3)</td></tr><tr><td>q_3</td><td>null</td><td>(q_2)</td></tr></table>	δ	0	1	q_0	(q_0,q_1)	(q_0)	q_1	(q_2)	(q_1)	q_2	(q_3)	(q_3)	q_3	null	(q_2)	3	1	7M
	δ	0	1																	
	q_0	(q_0,q_1)	(q_0)																	
	q_1	(q_2)	(q_1)																	
	q_2	(q_3)	(q_3)																	
q_3	null	(q_2)																		
	ii)Construct a DFA to accept the language $L=\{w/w \text{ has both an even number of 0's and an even number of 1's}\}$.	3	1	7M																
OR																				
b	i) Explain the different phases of the compiler.	4	2	7M																
	ii) Write the output of all phases of the compiler for the following expression: $x:=(a+b)*(c+d)$.	4	2	7M																
2	Unit-II																			
	a	i)Construct a predictive parsing table for the following grammar. $E \rightarrow TE^1; E^1 \rightarrow +TE^1 / \epsilon; T \rightarrow FT^1; T^1 \rightarrow *FT^1 / \epsilon; F \rightarrow (E) F \rightarrow id$	3	3	7M															
		ii)Consider the grammar $G, S \rightarrow aB \mid bA; A \rightarrow a \mid aS \mid bAA; B \rightarrow b \mid bS \mid aBB$ For the string aaabbabbba, construct i) Leftmost Derivation. ii) Rightmost Derivation.	3	3	7M															
	OR																			
	b	Explain Recursive descent parsing with an example.	3	3	14M															
3	Unit-III																			
	a	i)Consider the following $S \rightarrow iEtS/iEtSeS/a$ $E \rightarrow b$ Is LL(1) or not	3	3	7M															
		ii)Construct CLR Parsing table for the following grammar $S \rightarrow CC; C \rightarrow aC; C \rightarrow d$.	3	3	7M															
	OR																			
	b	i)Perform Shift-reduce parsing $E \rightarrow E+E/E*E/id$ Input string: id+id*id	3	4	7M															
		Discuss error recovery techniques in LR parsing with examples.	3	4	7M															
4	Unit-IV																			

	a	i) Explain storage allocation strategies.	3	4	7M
		ii) Differentiate inherited and synthesized attributes with an example.	3	4	7M
	OR				
	b	i) Write Quadruples, Triples, and Indirect triples for the following expression $a + a * (b - c) + (b - c) * d$	3	4	7M
		ii) Construct SDT for infix to postfix conversion?	3	4	7M
5	Unit-V				
	a	i) Construct DAG for the following code and optimize the 5 basic block $a = b * c$ $d = b$ $e = d * c$ $f = b + c$ $g = f + d$	3	5	7M
		ii) Explain Peephole optimization techniques.	3	5	7M
	OR				
	b	i) Explain different principle sources of Optimization with suitable examples.	3	5	7M
		Write Three Address Code for the following C code <pre> i=1; prod=0; do { Prod=prod+a[i]*b[i]; i=i+1; }while(i<=10); Also, find Basic blocks. </pre>	3	5	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome

M: Marks

Subject Code: R20IT3104

III B.Tech. - I Semester Supple Examinations, October-2025

ADVANCED WEB TECHNOLOGIES

(IT)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a	2	2	7M
	Explain Lifecycle of a Servlet with neat diagram			
	a	1	1	7M
	Demonstrate the use of Cookies in Servlets with an example.			
2	OR			
	b	5	2	7M
	Discuss about Session tracking in Servlets with a suitable example			
	b	1	2	7M
	What is Servlet? Explain about Servlet API			
3	Unit-II			
	a	3	3	7M
	Justify the differences between servlets and jsp			
	a	1	3	7M
	Explain about the getProperty() and setProperty() of beans in jsp			
4	OR			
	b	4	3	14M
	Explain the components of jsp.			
	Unit-III			
	a	1	4	7M
5	Explain about the anatomy of jsp			
	a	1	4	7M
	Explain about the jsp processing.			
	OR			
	b	4	4	14M
6	Explain about the JSP directive Elements. Explain each of them in detail			
	Unit-IV			
	a	3	5	7M
	Draw and explain JDBC Architecture			
	a	1	5	7M
7	What is JDBC. What are the various drivers of JDBC.			
	OR			
	b	3	5	7M
	How does Jdbc allows to access database through java			
	b	1	5	7M
8	Explain about Prepared statement, Meta data, Result set			
	Unit-V			
	a	5	6	7M
	Explain database connectivity in PHP with reference to MYSQL			
	a	1	6	7M
9	Explain variables and operators with example in PHP			
	OR			
	b	6	6	7M
	How to read data from web form control like Text boxes explain with an example.			
	b	2	6	7M
10	List and explain the string functions in PHP			

Subject Code: R20AI3105

III B.Tech. - I Semester Supple Examinations, October-2025
MACHINE LEARNING

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a i) Definition of Learning system and Explain Learning Multiple Classes.	K2	CO1	7M
	ii) Explain Supervised Learning: Learning a Class from Examples.	K2	CO1	7M
	OR			
	b i) Explain Probably Approximately Correct (PAC) Learning	K2	CO1	7M
	ii) What is machine learning, explain Goals and applications of machine learning	K2	CO1	7M
2	Unit-II			
	a i) Describe the concept of Maximum Likelihood Estimation (MLE) in parametric methods.	K2	CO2	7M
	ii) Explain the role of association rules in the context of Bayesian Decision Theory.	K2	CO2	7M
	OR			
	b Briefly Explain Bayesian Decision Theory -Parametric Methods, Classification, Losses and Risks, Discriminant Functions.	K2	CO2	14M
3	Unit-III			
	a i) Examine the underlying mathematical principles of Principal Components Analysis (PCA) and discuss how it reduces dimensionality while preserving variance.	K4	CO3	7M
	ii) Analyze how the FP Growth Algorithm can be applied in SCADA systems. Discuss the specific benefits and challenges of using association learning in such applications.	K4	CO3	7M
	OR			
	b i) Compare and contrast Linear Discriminant Analysis (LDA) and PCA in terms of their goals and methodologies for dimensionality reduction.	K4	CO3	7M
	ii) Evaluate the strengths and limitations of the Apriori Algorithm in generating frequent itemsets. How does its efficiency compare with other algorithms?	K4	CO3	7M
4	Unit-IV			
	a i) Illustrate the learning process in Self-Organizing Maps (SOM) with an example dataset. How does the map evolve over time?	K3	CO4	7M
	ii) Briefly Explain about the Expectation Maximization (EM) algorithm	K3	CO4	7M
	OR			
	b i) Explain different types of hierarchical Clustering, Choosing the Number of Clusters ?	K3	CO4	7M
	ii) Implement the k-Means Clustering algorithm on a sample dataset and demonstrate how the centroids are updated after each iteration.	K3	CO4	7M

Unit-V																													
5	a	i) Consider the following set of training examples:		<table><tr><td>Cough</td><td>Fever</td><td>Classification (Disease)</td></tr><tr><td>Yes</td><td>Yes</td><td>Positive</td></tr><tr><td>Yes</td><td>Yes</td><td>Positive</td></tr><tr><td>Yes</td><td>No</td><td>Negative</td></tr><tr><td>No</td><td>No</td><td>Positive</td></tr><tr><td>No</td><td>Yes</td><td>Negative</td></tr><tr><td>No</td><td>Yes</td><td>Negative</td></tr></table>		Cough	Fever	Classification (Disease)	Yes	Yes	Positive	Yes	Yes	Positive	Yes	No	Negative	No	No	Positive	No	Yes	Negative	No	Yes	Negative	K3	COS	7M
		Cough	Fever	Classification (Disease)																									
	Yes	Yes	Positive																										
	Yes	Yes	Positive																										
Yes	No	Negative																											
No	No	Positive																											
No	Yes	Negative																											
No	Yes	Negative																											
ii. What is the entropy (Information Gain) of this collection of training examples with respect to the target function Classification? ii. Apply decision tree algorithm on these training examples																													
b	ii) Explain the concept of Random forest algorithm with example.		K3	COS	7M																								
	OR																												
i) Difference between Decision Tree vs random Forest.		K3	COS	7M																									
ii) Explain how the tree selects the optimal feature at each node.		K3	COS	7M																									

OR



NARASARAOPETA ENGINEERING COLLEGE

(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20DS3102

BIG DATA ANALYTICS

R20

Time: 3 hours

CSE(DS)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Illustrate Google file system.	K2	1	7M
	ii) Explain about how to Verify SSH installation.	K2	1	7M
	OR			
	b i) Analyse the basic building blocks of Hadoop.	K3	1	7M
	ii) Explain about how to run Hadoop in standalone system.	K2	1	7M
2	Unit-II			
	a i) Explain about Map and Reduce methods in Hadoop.	K2	2	7M
	ii) Analyse the new Java MapReduce APIs FOR Map reducing Framework.	K3	2	7M
	OR			
	b i) Determine the process of MapReduce implementation.	K3	2	7M
	ii) Explain about driver code for MapReduce	K2	2	7M
3	Unit-III			
	a i) What is an Apache Spark and outline the RDD basics.	K2	3	7M
	ii) Explain about RDD basics.	K2	3	7M
	OR			
	b i) Explain about RDD operations.	K2	3	7M
	ii) Illustrate the various steps to create RDDs.	K3	3	7M
4	Unit-IV			
	a i) Explain about Pig Latin Application Flow.	K2	4	7M
	ii) Explain about Distributed Modes of Running Pig Scripts.	K2	4	7M
	OR			
	b i) Explain the architecture of Apache Pig.	K2	4	7M
	ii) Explain about Scripting with Pig Latin.	K2	4	7M
5	Unit-V			
	a i) Explain about Apache Hive.	K2	5	7M
	ii) Illustrate Hive datatypes.	K2	5	7M
	OR			
	b i) Analyse the web browser as Hive client	K3	5	7M
	ii) Explain about Joining tables with Hive.	K2	5	7M

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

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20CY3101 CRYPTOGRAPHY & NETWORK SECURITY

R20

Time: 3 hours

CSE(CY)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Explain how monoalphabetic ciphers work and their susceptibility to frequency analysis. Provide an example of encryption and decryption using a monoalphabetic cipher.	K2	CO1	7M
	ii) Compare and contrast block ciphers and stream ciphers in terms of their operational modes, strengths, weaknesses, and typical applications. Provide examples of widely used block and stream ciphers.	K2	CO1	7M
	OR			
	b i) Discuss the importance of confidentiality, integrity, and availability in securing network systems. Provide examples of how each of these services can be compromised and outline potential countermeasures.	K4	CO1	7M
2	ii) Explain how polyalphabetic ciphers like the Vigenère cipher work and demonstrate their encryption and decryption with an example.	K2	CO2	7M
	Unit-II			
	a i) Discuss the design principles of block ciphers. What criteria must a secure block cipher meet, and why are these criteria important? Provide examples to support your explanation.	K3	CO2	7M
	ii) Explain the Electronic Codebook (ECB) mode of operation for block ciphers. What are its advantages and disadvantages? Provide an example that illustrates a major security flaw in ECB mode.	K2	CO2	7M
	OR			
	b i) The Data Encryption Standard (DES) uses a 16-round Feistel structure. Explain how DES works, focusing on its key schedule and S-boxes. Why is DES considered insecure today?	K2	CO2	7M
3	ii) Explain how CFB mode works and describe a scenario where CFB would be preferred over other modes of operation.	K2	CO2	7M
	Unit-III			
	a i) Using Euler's Totient Function, compute the value of $\phi(2310)$ where $2310=2 \times 3 \times 5 \times 7 \times 11$. Explain the function and show detailed steps.	K3	CO3	7M
	ii) Consider the RSA algorithm with primes $p=13$ and $q=17$. Compute the public and private keys. Encrypt the message $m=9$ using the public key, and decrypt it using the private key. Show all calculations.	K3	CO3	7M
	OR			
	b i) Using Fermat's Little Theorem, calculate $3^{100} \bmod 7$. Prove the theorem and apply it to solve the problem.	K3	CO3	7M
	ii) Compare and contrast the RSA and Diffie-Hellman key exchange algorithms in terms of their security, computational complexity, and use	K5	CO3	7M

		cases. Provide examples where one might be preferred over the other.			
4	Unit-IV				
	a	i) What are the key differences between using HMAC and a standard MAC? Discuss the benefits of using HMAC in securing internet protocols like HTTPS.	K2	CO4	7M
		ii) Explain the basic concept of a digital signature scheme. How do digital signatures ensure both data integrity and non-repudiation? Provide a real-world example of their application.	K2	CO4	7M
	OR				
	b	i) Describe the SHA-512 hash function. Explain its internal workings, including message padding, block processing, and digest generation.	K3	CO4	7M
		ii) Explain how the Digital Signature Algorithm (DSA) works. Provide a detailed breakdown of the signing and verification processes in DSA.	K3	CO4	7M
5	Unit-V				
	a	i) Describe the key components and architecture of Kerberos Version 4. How does the Ticket Granting Service (TGS) work within this framework to ensure secure communication?	K3	CO5	7M
		ii) Explain the architecture of Secure Sockets Layer (SSL). Describe how SSL ensures confidentiality, integrity, and authentication between a client and server during a web transaction.	K2	CO5	7M
	OR				
	b	i) Explain the X.509 directory authentication service. How does the certificate authority (CA) structure work in X.509 to manage certificates and enable secure communication between users?	K2	CO5	7M
		ii) Compare and contrast SSL and TLS (Transport Layer Security). What improvements were made in TLS over SSL, and why is TLS considered more secure in modern web applications?	K4	CO5	7M

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

NEC ENGINEERING COLLEGE (AUTONOMOUS)

Subject Code: R20CC10E01

III B.Tech. - I Semester Supple Examinations, October-2025

DISASTER MANAGEMENT

(CE&IT)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

Q No	Questions	K L	CO	Marks
1	Unit-I			
	a i) How the manmade hazards trigger natural disaster? Justify.	K2&K3	C01	7M
	ii) Discuss in detail different drought patterns and their causes	K2&K3	C01	7M
	OR			
	b i) What is the difference between vulnerability and disaster?	K2&K3	C01	7M
	ii) Critically examine the various factors affecting vulnerability in disaster risk management.	K2&K3	C01	7M
2	Unit-II			
	a i) Explain About The Disaster Management Cycle?	K2&K3	C02	7M
	ii) Explain the manmade disaster and their management in detailed.	K2&K3	C02	7M
	OR			
	b i) Write a short note on risk management and crisis management?	K2&K3	C02	7M
	ii) What are the different approaches for disasters with human ecology?	K2&K3	C02	7M
3	Unit-III			
	a i) Explain the various stages in the disaster management.	K2&K3	C03	7M
	ii) Explain about the structural & non-structural measure capacity assessment?	K2&K3	C03	7M
	OR			
	b i) What are the types of capacity building in disaster management?	K2&K3	C03	7M
	ii) Explain Legislative Support at the state and national levels	K2&K3	C03	7M
4	Unit-IV			
	a i) Explain the different types of coping strategies?	K2&K3	C04	7M
	ii) What are the pre disaster measures taken to manage earthquake disaster?	K2&K3	C04	7M
	OR			
	b i) What is the role of social media in disaster management?	K2&K3	C04	7M
	ii) Explain the Industrial Safety Plan, norms and survival kits with respect disaster management	K2&K3	C04	7M
5	Unit-V			
	a i) Explain community capacity and disaster resilience.	K2&K3	C05	7M
	ii) Write about Preparation of state and district disaster management plans	K2&K3	C05	7M
	OR			
	b i) Discuss in brief the Disaster Management Act 2005.	K2&K3	C05	7M
	ii) Explain on the public awareness and public education for disaster risk reduction	K2&K3	C05	7M

Subject Code: R20CC1OE10

III B.Tech. - I Semester Supple Examinations, October-2025

DATABASE MANAGEMENT SYSTEM

(EEE, ECE)

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No.	Questions	KL	CO	Marks
1	Unit-I			
	a Explain the differences between File System and DBMS.	1	2	14M
	OR			
	b If you were designing a Web-based system to make airline reservations and sell airline tickets, which DBMS architecture would you choose? Why? Why would the other architectures not be a good choice?	1	3	7M
	Discuss the differences between database systems and information retrieval systems.	1	2	7M
2	Unit-II			
	a Construct E-R Diagram for Library Management System	2	2	14M
	OR			
	b How does a category differ from a regular shared subclass? What is a category used for? Illustrate your answer with example.	2	2	7M
3	Discuss the two main types of constraints on specializations and generalizations.	2	2	7M
	Unit-III			
	a Explain the data types that are allowed for SQL attributes.	3	2	7M
	Describe the four clauses in the syntax of a simple SQL retrieval query. Show what type of constructs can be specified in each of the clauses. Which are required and which are optional?	3	3	7M
	OR			
4	Discuss how NULLs are treated in comparison operators in SQL. How are NULLs treated when aggregate functions are applied in an SQL query? How are NULLs treated if they exist in grouping attributes?	3	3	7M
	Consider the following schema. Draw ER diagram for given schema and construct the queries in SQL for creating tables and given questions below. <i>Dept(deptno: int, dname: string, loc: string)</i> <i>Emp(empno: int, ename: string, job: string, sal: num, deptno:num)</i> - List all employee details who belongs to deptno=10 and whose job is clerk - Find employee details who have same job as blake? - Update emp table and change sal, comm. To 2000 & 500 to an employeeeno 7844 - Display employee names, employee number, deptname & location of all employees?	3	3	7M
4	Unit-IV			
	a What is meant by the attribute preservation condition on a decomposition? Explain why normal forms are alone insufficient as a condition for a good schema design?	4	2	7M
	Discuss attribute semantics as an informal measure of goodness for a relation schema.	4	2	7M

	OR				
	b	Why can we not infer a functional dependency automatically from a particular relation state? What is multivalued dependency? When does it arise?	4	2	7M
		What undesirable dependencies are avoided when a relation is in 2NF? Explain with example.	4	2	7M
5	Unit-V				
	a	Discuss the techniques for allocating file blocks on disk.	5	2	7M
		Why is accessing a disk block expensive? Discuss the time components involved in accessing a disk block.	5	2	7M
	OR				
	b	What are the differences among primary, secondary, and clustering indexes? How do these differences affect the ways in which these indexes are implemented? Which of the indexes are dense, and which are not	5	2	7M
		What is the order p of a B-tree? Describe the structure of B-tree nodes.	5	2	7M

KL: Blooms Taxonomy Knowledge Level

CO: Course Outcome M: Marks

Subject Code: R20CC10E16

III B.Tech. - I Semester Supple Examinations, October-2025

COMPUTER ORGANIZATION

Time: 3 hours

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 =70M)

QNo	Questions	KL	CO	Marks
1	Unit-I			
	a i) Explain the architecture of microcomputer with neat diagram.	K4	CO1	7M
	ii) Interpret all logical micro operations.	K2	CO1	7M
	OR			
	b i) Sketch a neat diagram of Binary Adder and Subtractor and explain how it works.	K3	CO1	7M
	ii) Summarize all the different types of shift micro-operations and explain.	K2	CO1	7M
2	Unit-II			
	a i) Explain Timing and Control Unit with neat diagram.	K4	CO2	7M
	ii) Determine what is "Stored program organization".	K3	CO2	7M
	OR			
	b Sketch the instruction cycle flow chart and explain in detail.	K3	CO2	14M
3	Unit-III			
	a i) Explain all the addressing modes.	K4	CO3	7M
	ii) Illustrate any 5 arithmetic instructions and 5 logical instructions.	K4	CO3	7M
	OR			
	b i) Distinguish between CISC and RISC.	K4	CO3	7M
	ii) Summarize Micro program sequencer.	K2	CO3	7M
4	Unit-IV			
	a i) Explain the concept of direct mapped cache.	K4	CO4	7M
	ii) Summarize different auxiliary memories.	K2	CO4	7M
	OR			
	b Sketch the flowchart for Booth's Multiplication Algorithm and give a numerical example.	K3	CO5	14M
5	Unit-V			
	a i) Determine what is the need of an I/O Interface? Distinguish between Memory mapped I/O and Isolated I/O.	K3	CO6	7M
	ii) Explain programmed I/O with neat diagram.	K4	CO6	7M
	OR			
	b i) Explain priority interrupt controller with neat diagram.	K4	CO6	7M
	ii) Summarize DMA Data Transmission.	K2	CO6	7M

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20CC10E17 MEAN STACK TECHNOLOGIES

Time: 3 hours

CSE(AI&ML)

Max. Marks: 70

R20

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Summarize different Component and Attribute directives present in Angular.	K2	1	7M
	ii) Illustrate pipes with examples and specify the purpose.	K2	1	7M
	OR			
	b Present the Angular architecture in detail.	K3	1	14M
2	Unit-II			
	a Implement a toolbar in an angular app and explain the use of material module to create the toolbar.	K3	2	14M
	OR			
	b Explain the concept of Routing and Navigation with an example program.	K4	2	14M
3	Unit-III			
	a Explain Traditional Web Server model and Node.js process model in detail.	K4	3	14M
	OR			
	b Implement a web server with Node.js and explain the procedure in detail.	K3	3	14M
4	Unit-IV			
	a i) Articulate how Event Handling can be done in Node.js	K3	3	7M
	ii) Determine the advantages of Express.js when compared with Node.js?	K3	4	7M
	OR			
	b Summarize the Node.js file system and specify how to perform read and write operations.	K2	3	14M
5	Unit-V			
	a i) Create a database in MongoDB and establish a connection with it through code.	K3	5	7M
	ii) Create a collection in MongoDB database and insert multiple documents into it at a time.	K3	5	7M

OR

b	i) Design a program to update a document at a time in MongoDB database.	K4	5	7M
	ii) Design a program to update specific fields in the collection in MongoDB database.	K4	5	7M

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

III B.Tech I Semester Supple. Examinations, October-2025

Sub Code: R20CC1OE19

CLOUD COMPUTING

R20

Time: 3 hours

CSE(CY)

Max. Marks: 70

Note: Answer All FIVE Questions.

All Questions Carry Equal Marks (5 X 14 = 70M)

Q.No	Questions	KL	CO	M
1	Unit-I			
	a i) Define Cloud computing? Explain in detail about advantages and disadvantages of Cloud computing?	K2	CO2	7M
	ii) Describe the steps to develop cloud infrastructure?	K2	CO3	7M
	OR			
	b i) Demonstrate cloud computing in the perspective of business and information.	K2	CO2	7M
	ii) Analyse the vendors of cloud computing.	K3	CO2	7M
2	Unit-II			
	a i) Explain different types of virtualization in detail.	K2	CO1	14M
	OR			
	b i) Describe similarities and differences between Grid computing and Cloud Computing?	K2	CO2	7M
	ii) With a diagram explain the architecture of a computer system before and after virtualization.	K2	CO1	7M
3	Unit-III			
	a i) Explain Layered architectural development of the cloud platform for IaaS, PaaS, and SaaS applications over the Internet.	K2	CO3	14M
	OR			
	b i) Explain about cloud deployment models in detail? Also explain how can a private cloud be enabled to expand into hybrid cloud environment?	K2	CO2	14M
4	Unit-IV			
	a i) Demonstrate disaster recovery planning.	K2	CO3	7M
	ii) Differentiate between IT Service and Cloud Service providers	K4	CO3	7M
	OR			
	b i) Discuss about disaster management.	K2	CO3	7M
	ii) Discuss the process in cloud service management	K2	CO3	7M
5	Unit-V			
	a i) Explain in detail about AWS Services with suitable examples	K2	CO4	10M
	ii) Analyze Why Microsoft Azure is known as PaaS cloud offering in general?	K4	CO4	4M
	OR			
	b i) Explain about advantages and disadvantages of Azure in detail?	K2	CO4	7M
	ii) Compare and Contrast Azure and AWS	K2	CO4	7M

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