R20

III B.TECH I SEM

SUPPLEMENTARY EXAMINATIONS

MARCH 2025

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations - MAR-2025

Sub Code: R20CC31MC01 PROFESSIONAL ETICS AND HUMAN VALUES

Time: 3 hours   (CE,EEE,ME,ECE,CSE(AIML),DS,CS)   Max. Marks: 70

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

Q.No			Questions	KL	CO	M
1	a		**Unit-I**			
			Explain the concept of work ethics and discuss the challenges that must be overcome to maintain them.	K5	1	14M
			OR			
	b		Explain the following concepts: A) Civic Virtue B) Respect for Others C) Cooperation D) Service Learning	K2	1	14M
2			**Unit-II**			
	a		Compare and contrast Lawrence Kohlberg's theory of moral development with Carol Gilligan's theory.	K4	2	14M
			OR			
	b		Discuss the roles of engineers as managers, consultants, and leaders. Explain the key characteristics of engineering professionals.	K4	2	14M
3			**Unit-III**			
	a		Describe the types of occupational crimes that professionals may engage in.	K2	3	14M
			OR			
	b		Explain the concept of human rights. Discuss the foundation of professional rights.	K2	3	14M
4			**Unit-IV**			
	a		Explain the components of emotional intelligence and discuss the Salovey and Mayer model, providing an example.	K5	4	14M
			OR			
	b		Discuss the following principles for achieving harmony: A) Truthfulness B) Customs and Traditions C) Human Dignity D) Gender Equality	K5	4	14M
5			**Unit-V**			
	a		Discuss the threshold levels of risk. Compare the advantages and disadvantages of delayed risk versus immediate risk.	K5	5	14M
			OR			
	b		Explain engineers' responsibilities concerning voluntary and involuntary risks.	K5	5	14M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC3101

III B.Tech. - I Semester Supple Examinations, March-2025
OPERATING SYSTEMS
(CSE,IT,AI & DS)

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	a		**Unit-I**			
			(i)Describe the functions of an Operating System?	K2	CO1	7M
			(ii) Categorize the system calls in Operating Systems	K2	CO1	7M
			OR			
	b		(i) Describe briefly about protection and security?	K2	CO1	7M
			(ii)What does the operating system do from user and system point of view	K2	CO1	7M
2	a		**Unit-II**			
			(i) Explain about Process states with neat Sketch	K2	CO2	7M
			(ii)Describe scheduling criteria	K2	CO2	7M
			OR			
	b		Consider the following processes with their burst times. Determine the average waiting time and average turnaround time using the FCFS and SJF (Shortest Job First) non-preemptive scheduling algorithm. Process / Arrival Time / Burst Time: P1 0 7; P2 2 4; P3 4 1; P4 5 4	K3	CO2	14M
3	a		**Unit-III**			
			(i) Explain the Dining Philosopher Problem and provide a solution using semaphores	K2	CO3	7M
			(ii) Write about Bounded Buffer Problem			7M
			OR			
	b		(i) Describe the paging concept in detail	K2	CO3	7M
			(ii)Illustrate the contiguous Memory Allocation	K3	cO3	7M
4	a		**Unit-IV**			
			(i) Using the following reference string and 3-pageframes, simulate the FIFO page replacement algorithm and determine the number of page faults:7,0,1,2,0,3,0, 4,2,3,0,3,2.	K4	CO4	7M
			(ii) Explain about Virtual memory			7M

The process table for Q2:

Process	Arrival Time	Burst Time
P1	0	7
P2	2	4
P3	4	1
P4	5	4

		OR			
	b	(i)What are the necessary and sufficient conditions for a deadlock to occur?	K2	CO4	7M
		(ii)Explain about Resource Allocation graph with example	K2	CO4	7M
5		**Unit-V**			
	a	(i) Explain about Directory Structures	K2	CO5	7M
		(ii)illustrate file allocation methods	K2	CO5	7M
		OR			
	b	Explain about Disc Scheduling Algorithms. Given the following sequence of disk requests and an initial head position of 50, calculate the total head movement using the FCFS disk scheduling algorithm: 98, 83,37,122,14,124,65,67.	K4	CO5	14M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC3102

III B.Tech. - I Semester Supple Examinations, March-2025
DATA WAREHOUSING AND DATA MINING
(CSE,IT,AI)

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
			Unit-I			
1	a		Illustrate the architecture of a typical Data mining system.	K2	1	7M
			Discuss about the Major issues in Data Mining.	K1	1	7M
			OR			
	b		Explain the different types of data on which Mining can be performed.	K2	1	7M
			Explain about Data Transformation method with suitable example.	K2	1	7M
2			**Unit-II**			
			Classify different data preprocessing techniques used to improve the overall quality of the mined data.	K1	2	14M
			OR			
	b		Discuss about detecting data redundancy using correlation analysis.	K2	2	7M
			Describe briefly Discretization and concept hierarchy generation for numerical data?	K2	2	7M
3			**Unit-III**			
	a		Discuss about OLAP operations in the multidimensional data model.	K2	3	7M
			Explain about from On-Line Analytical Processing to Online Analytical Mining.	K2	3	7M
			OR			
	b		Discuss about Star-net Query model for querying multidimensional data model.	K2	3	7M
			Explain about Indexing OLAP Data with an example.	K2	3	7M
4			**Unit-IV**			
	a		Discuss about Decision tree induction algorithm with an example.	K2	4	7M
			Explain in detail about partitional Clustering method.	K2	4	7M
			OR			
	b		Discuss about k-nearest neighbor classification algorithm with an example?	K2	4	7M
			Explain in detail about Hierarchical Clustering.	K2	4	7M
5			**Unit-V**			
	a		Explain in detail about Multidimensional association rule.	K2	5	7M
			Discuss about FP-growth algorithm for the following given example{M,O,N,K,E,Y} {D,O,N,K,E,Y} {M,A,K,E} {M,U,C,K,Y} {C,O,O,K,I,E}, Support= 60 %, Confidence = 80 %.	K3	5	7M

			OR			
		Explain in detail about support and Confidence Measures with an example.		5	7M
	b	State and explain Apriori Algorithm with an example Consider the following data set to generate Association rules {M,O,N,K,E,Y} {D,O,N,K,E,Y} {M,A,K,E} {M,U,C,K,Y} {C,O,O,K,I,E}, Support= 60 %, Confidence = 80 %.	K3	5	7M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC3103

III B.Tech. - I Semester Supple Examinations, March-2025
DESIGN AND ANALYSIS OF ALGORITHMS
(CSE,AI)

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
			Unit-I			
1	a		Explain about Space complexity	K3	1	7M
			What is the importance of Asymptotic Notations in measuring the Algorithms performance	K3	1	7M
			OR			
	b		Write about time Complexity	K3	1	7M
			Write the difference between Big-oh notation, Omega notation, Theta notation	K3	1	7M
			Unit-II			
2	a		Explain Binary Search in detail along with the time complexity	K3	2	7M
			Explain Quick sort in detail along with the time complexity	K3	2	7M
			OR			
	b		Explain in detail about Strassen's matrix multiplication with an example	K3	2	14M
			Unit-III			
3	a		Explain about Knapsack Problem	K3	3	7M
			Write about Single Source Shortest Paths with an example	K3	3	7M
			OR			
	b		Explain about Job Sequencing with Deadlines	K3	3	7M
			Consider an example and explain about Minimum cost spanning trees	K3	3	7M
			Unit-IV			
4	a		Consider an example to explain Optimal binary search trees	K3	4	14 M
			OR			
	b		Write about the Travelling sales person problem	K3	4	7M
			Explain about Matrix-chain multiplication.	K3	4	7M
			Unit-V			
5	a		Write about N-Queen problem	K3	5	7M
			What do you mean by Graph coloring and why it is important in solving the graph problem	K3	5	7M
			OR			
	b		What do you mean by Hamiltonian cycles and why they are important with an example	K3	5	7M
			Write about Branch and Bound: 0/1 knapsack problem in detail	K4	6	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC3104

III B.Tech. - I Semester Supple Examinations,March-2025
COMPUTER NETWORKS
(CSE,AI)

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	M
1		**Unit-I**			
	a	Analyze the architectural differences between Novell Networks and ARPANET.	K4	CO1	7M
		Compare and contrast the design, structure, and use cases of WAN and MAN topologies.	K2	CO1	7M
		OR			
	b	Discuss the importance of the physical and data link layers in the OSI model, focusing on how they handle errors and flow control.	K2	CO1	7M
		Compare and Contrast OSI and TCP/IP	K3	CO1	7M
2		**Unit-II**			
	a	A 7-bit data word "1001101" is to be transmitted using Hamming (7,4) code. Determine the parity bits and construct the codeword. If a single bit error occurs during transmission, how would the Hamming code correct this error?	K3	CO2	7M
		Compare the design and operational differences between the IEEE 802.3 (Ethernet) and IEEE 802.11 (Wi-Fi) standards. How do these standards address unique challenges such as collision detection in a wired network versus a wireless network?	K4	CO2	7M
		OR			
	b	Discuss the services provided by the data link layer	K2	CO3	7M
		Given a 16-bit data word "1101011010110001" and a CRC polynomial "1101," calculate the CRC remainder. Show all steps involved in the division process, and explain how this remainder is used for error detection.	K3	CO3	7M
3		**Unit-III**			
	a	Compare the efficiency of the Sliding Window protocol with Stop and Wait.	K2	CO3	7M
		Analyse the performance of the pure ALOHA protocol in a heavily congested network. What are the main causes of reduced throughput, and how would switching to slotted ALOHA improve performance?	K3	CO3	7M
		OR			
	b	Apply CSMA/CA to a wireless network where multiple users are trying to transmit simultaneously. Describe how the protocol uses RTS/CTS signals to avoid collisions and improve throughput.	K4	CO3	7M
		Compare the Stop and Wait protocol and the Sliding Window protocol by applying both to a scenario with a 10 ms round-trip time and a 1 Mbps link. Calculate the efficiency of each protocol.	K2	CO3	7M
4		**Unit-IV**			
	a	Explain the structure and significance of an IP address. What are the differences between classful and classless addressing, and how do subnetting and super netting work?	K2	CO4	14M

			KL	CO	M
		OR			
	b	Explain the link state routing algorithm. How does it differ from distance vector routing, and what are its advantages in large networks?	K2	CO4	7M
		Given the subnet 192.168.50.0/26, how many total IP addresses are available, and how many can be assigned to hosts? What is the network address, broadcast address, and range of assignable IP addresses?	K3	CO4	7M
5		**Unit-V**			
	a	Describe the process of connection establishment in transport layer protocols like TCP. What challenges are associated with connection establishment, and how are they addressed?	K2	CO5	7M
		Explain the hierarchical structure of the DNS namespace. How does this structure facilitate efficient domain name resolution?	K2	CO5	7M
		OR			
	b	Explain how the HTTP protocol works. What are the differences between HTTP and HTTPS, and how do they ensure secure communication?	K2	CO5	7M
		UDP is often used in real-time applications. Explain why UDP is preferred in certain applications over TCP, despite its lack of reliability features.	K3	CO5	7M

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

R20

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

Sub Code: R20CC3109　　　　　　　　**DEVOPS**

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
			Unit-I			
1	a	i) Explain the phases of the Software Development Life Cycle (SDLC) with a detailed description of each phase.	K2	CO1	7M
		ii) Discuss the values and principles of Agile Software Development as outlined in the Agile Manifesto. How do these values and principles contribute to the effectiveness of the Agile methodology in software projects?	K2	CO1	7M
			OR			
	b	i) What are the benefits and challenges of adopting Agile methodology in software development projects? Provide relevant examples.	K2	CO1	7M
		ii) How do Agile practices like Continuous Integration (CI) and Test-Driven Development (TDD) improve software quality? Discuss their roles in Agile processes.	K2	CO1	7M
			Unit-II			
2	a	i) Explain the fundamental principles of DevOps. How does it differ from traditional software development and operations practices?	K2	CO2	7M
		ii) Discuss the key components of DevOps architecture. How does it enable continuous integration and continuous delivery (CI/CD)?	K2	CO2	7M
			OR			
	b	i) Analyse the phases of DevOps Pipeline	K2	CO2	7M
		ii) Analyse the principles of DevOps and roles and responsibilities of DevOps Engineer	K2	CO2	7M
			Unit-III			
3	a	i) Describe the DevOps adoption in projects to focus on people and process aspects	K6	CO3	7M
		ii) Explain the role of Agile capabilities in the successful implementation of DevOps. How do Agile practices complement the DevOps approach in modern software development?	K6	CO3	7M
			OR			
	b	i)Describe the DevOps adoption in projects to focus on Technology aspects	K6	CO3	7M
		ii) Discuss the technological aspects of DevOps adoption in a project. How does the choice of technology stack impact the success of a DevOps initiative?	K6	CO3	7M
			Unit-IV			
4	a	i) Analyze the CI and CD Pipeline	K5	CO4	7M
		ii) Discuss the key benefits of adopting CI/CD practices in software development. How does CI/CD improve the overall development and deployment process?	K5	CO4	7M
			OR			
	b	i) Analyse Benefits of CI/CD and Metrics to track CICD practices	K5	CO4	7M
		ii) Define Continuous Integration (CI), Continuous Delivery (CD), and Continuous Deployment. Explain the differences between these concepts, with relevant examples.	K5	CO4	7M

		Unit-V			
5	a	i) Analyse the Key factors of DevOps maturity model	K2	CO5	7M
		ii) What are the key factors of the DevOps Maturity Model? Explain how each factor contributes to the overall maturity of a DevOps organization.	K2	CO5	7M
		OR			
	b	i) Analyse the different stages of DevOps maturity Model	K2	CO5	7M
		ii) Discuss the stages of the DevOps Maturity Model. How does an organization progress through these stages to achieve higher DevOps maturity	K2	CO5	7M

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

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NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

III B.Tech I Semester Supple. Examinations, March-2025
Sub Code: R20CC3110   PRINCIPLES OF MACHINE LEARNING

R20

Time: 3 hours

CSE(AI&ML,CS)

Max. Marks: 70

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

Q.No			Questions	KL	CO	M
1	a	i)	Define a well-posed learning problem. Discuss the challenges in designing a learning system.	4	1	7M
		ii)	Explain the Find-S algorithm with an example.	4	1	7M
			OR			
	b	i)	Illustrate the concept of learning as a search with a practical example.	4	1	7M
		ii)	Apply the Candidate Elimination algorithm to solve a given problem and demonstrate its use.	4	1	7M
			Unit-II			
2	a	i)	Apply decision tree learning to classify a dataset of your choice.	3	2	7M
		ii)	Explain the hypothesis space search in decision tree learning.	3	2	7M
			OR			
	b	i)	Identify and discuss the inductive bias present in decision tree learning.	3	2	7M
		ii)	Discuss issues encountered in decision tree learning.	3	2	7M
			Unit-III			
3	a	i)	Analyze the motivation behind hypothesis evaluation in machine learning.	4	3	7M
		ii)	Calculate the hypothesis accuracy using the basics of sampling theorem for a given dataset.	4	3	7M
			OR			
	b	i)	Explain how confidence intervals can be derived for hypothesis evaluation.	4	3	7M
		ii)	Compare two learning algorithms based on their error rates using statistical techniques.	4	3	7M
			Unit-IV			
4	a	i)	Apply the PAC learning framework to evaluate a learning algorithm.	4	1	7M
		ii)	Discuss the Vapnik-Chervonenkis (VC) dimension and its role in computational learning theory.	4	1	7M
			OR			
	b	i)	Analyze the sample complexity for infinite hypothesis spaces in the context of PAC learning.	4	1	7M
		ii)	Explain the models of learnability, including learning in the limit, with examples.	4	1	7M
			Unit-V			
5	a	i)	Apply the Naïve Bayes learning algorithm to classify a dataset.	3	4	7M
		ii)	Compare generative and discriminative models using logistic regression.	3	4	7M
			OR			
	b	i)	Solve a regression problem using k-nearest neighbor learning.	3	5	7M
		ii)	Demonstrate the use of locally weighted regression on a practical dataset.	3	5	7M

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

1

Sub Code: R20CE3101

III B.Tech I Semester Supple Examinations, March-2025
DESIGN AND DRAWING OF CONCRETE STRUCTURES

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

Answer any ONE Question from Part – A and any THREE Questions from Part – B

Use of IS: 456-2000 and design charts from SP-16 is allowed.

Q.No.		Questions	KL	CO	Marks
		PART A			
1		A reinforced concrete beam is simply supported over a clear span of span 6 m. The beam carries a superimposed load of 10 kN/m. Design the beam if the width of the beam is 300 mm. Use M20 grade concrete and Fe 415 steel. The beam is resting on 400 mm thick walls. Sketch the details of reinforcement.	K4	CO1	[28M]
		OR			
2		The panel of slab is 4.5 m x 5 m. One short edge and one long edge of the slab is discontinuous and other short edge and long edges are continuous. The slab is restrained with edge beam. Super imposed load is 3.5 kN/m2 and floor finishes being 1.0 kN/m2. Design the slab. Use M20 grade concrete and Fe 415 steel. Sketch the details of reinforcement also.	K4	CO3	[28M]
		PART B			
3	a	What are different methods of design in R.C.C?	K2	CO1	[7M]
	b	Draw stress block diagram and evaluate the following expressions for limit state design: a) Neutral Axis depth b) Lever arm c) Moment of resistance	K2	CO1	[7M]
4.		A doubly reinforced beam 300 mm x 680 mm effective is reinforced on tension and compression side with 4 numbers of 25 mm diameter bars. Compression steel is placed 40 mm from top of the beam. If the beam carries a bending moment of 215 x 106N-mm, find the stresses induced in steel and concrete. Take m = 13.33	K4	CO2	[14M]
5		Design an R.C.C. slab of size 5 m x 6 m, simply supported on all four edges with corners held down. The slab is carrying a load of 4 kN/m² including floor finish etc. Use M 20 concrete and Fe 415 steel.	K4	CO3	[14M]
6		Design a R.C.C. column to carry an axial load of 2000N. The size of the column is restricted to 600 mm square. The effective height of column is 9 m. Use M20 concrete and σsc = 190 N/mm².	K4	CO4	[14M]
7		Design a rectangular footing of uniform thickness for an axially loaded column of size 300 mm x 600 mm. Load on the column is 1150 kN. Safe bearing capacity of the soil is 200 kN/m². Use M20 concrete and Fe 415 steel	K4	CO5	[14M]

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

Subject Code: R20CE3102

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
			Unit-I			
1	a		The Atterberg limits of clay soil are: Liquid Limit is 76%, Plastic Limit is 44% and shrinkage limit is 26%. If a sample of the soil has a volume of 30cm³ at the liquid limit and a volume of 16.6cm³ at the shrinkage limit. Determine the specific gravity of solids, shrinkage ratio, and volumetric shrinkage.	K4	CO1	7M
			Explain the purpose of Soil classification. List out the classification of soil and explain textural classification?	K2	CO1	7M
			OR			
	b		Explain briefly about the formation of soils.	K2	CO1	7M
			Discuss the phenomena of formation and transportation of soils.	K3	CO1	7M
			Unit-II			
2	a		Discuss the total stress, effective stress, and neutral stress as applied to soils.	K2	CO2	7M
			Define effective stress and the importance of effective stress.	K1	CO2	7M
			OR			
	b		A soil profile consists of a surface layer of sand 3.5m thick (ρ=1.65 mg/m³), an intermediate layer of clay 2.5 m thick (ρ=1.95 mg/m³), and the bottom layer of gravel 3.5m thick (ρ=1.925 mg/m³). The water table is at the upper surface of the clay layer. Determine the effective stress at various levels immediately after placement of a surcharge load of 58.86 KN/m² to the ground surface.	K4	CO2	14M
			Unit-III			
3	a		A long strip footing of width 2m carries a load of 400KN/m. Calculate the maximum stress at a depth of 5m below the center of a line of footing. Compare the results with the 2:1 distribution method.	K4	CO3	7M
			Discuss Westergaard's theory for the determination of the vertical stress at a point. How is it different from Boussinesq's solution?	K2	CO3	7M
			OR			
			Mention the difference between Boussinesq's and Westergaurds theories.	K2	CO3	7M
	b		A cylindrical specimen of saturated clay, 4 cm in diameter and 9cm overall length is tested in an unconfined compression tester. The specimen has conned ends and its length between the apices of cones is 8 cm. Find the unconfined compressive strength of clay, if the specimen fails under an axial load of 46.5 N. The change in length of the specimen at failure is 1 cm.	K4	CO3	7M
4			**Unit-IV**			
	a		Derive the equation for the coefficient of consolidation (1D)	K2	CO4	7M
			Explain the Limitations of Terzaghi's theory of consolidation. Why this theory is used despite its limitations.	K3	CO4	7M

			KL	CO	M
	b	Briefly explain the procedure of the consolidation test.	K2	CO4	7M
		Discuss Terzaghi's theory of one-dimensional primary consolidation with its assumptions.	K3	CO4	7M
		Unit-V			
5	a	Explain the salient features of the Jodhpur mini-compaction test.	K1	CO5	7M
		Explain briefly about the factors affecting compaction.	K2	CO5	7M
		OR			
	b	A Sample of soil was prepared by mixing a quantity of dry soil with a 10% mass of water. Find the mass of this wet mixture required to produce a cylindrical compacted specimen of 17cm diameter and 14.5 cm deep and having 6% air content. Find the void ratio and dry density of the specimen if G is 2.68.	K4	CO5	7M
		Briefly explain the effect of compaction on the properties of soils.	K2	CO5	7M

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

Subject Code: R20CE3103

III B.Tech. - I Semester Supple Examinations, March-2025
HIGHWAY ENGINEERING
(CE)

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 various classifications of roads.	K2	CO1	**7M**
		Explain in detail the reconnaissance survey for highway locations in rural areas.	K3	CO1	**7M**
		OR			
	b	Explain the Bombay Road Congress 1961.	K2	CO1	**7M**
		Explain the requirements of ideal highway alignment and the factors controlling the alignment.	K2	CO1	**7M**
2		**Unit-II**			
	a	Discuss the factors affecting Sight distance.	K2	CO2	**7M**
		Explain the factors affecting Geometric design.	K2	CO2	**7M**
		OR			
	b	The speed of overtaking and overtaken vehicles is 80 and 50 kmph respectively. On a two-way traffic load, the acceleration of overtaking vehicles is 0.99 m/sec². Calculate OSD, mention the minimum length of the overtaking zone, and sketch the overtaking zone with all details.	K3	CO2	**14M**
3		**Unit-III**			
	a	Explain the fundamental principles and objectives of traffic engineering and how they guide the planning and management of transportation systems.	K2	CO3	**7M**
		Explain the methodologies and data sources used to analyze travel patterns and demand, and how this information informs transportation infrastructure planning.	K2	CO3	**7M**
		OR			
	b	Discuss the different types of intersections.	K2	CO3	**7M**
		Explain briefly about the design of the rotary intersection.	K2	CO3	**7M**
4		**Unit-IV**			
	a	Compare Flexible and Rigid pavements.	K2	CO4	**7M**
		Explain the CBR method of design of flexible pavements.	K2	CO4	**7M**
		OR			
	b	Design the pavement for the construction of a new two-lane carriageway for a design life of 15 years using the IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and the growth rate is 5%. Vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil = 4%.	K3	CO4	**7M**
		Explain the design procedure for rigid pavements.	K2	CO4	**7M**

		Unit-V			
5	a	Infer the modern construction materials used for the construction of pavement? Explain their characteristics and usage in detail.	K3	CO5	7M
		Explain the different forms of bitumen.	K2	CO5	7M
		OR			
	b	Discuss in detail any four methods of strengthening pavements.	K3	CO5	7M
		Briefly discuss the different types of failures of rigid pavements.	K2	CO5	7M

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

Subject Code: R20CE3104

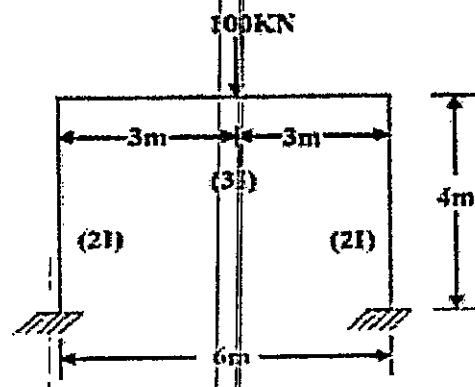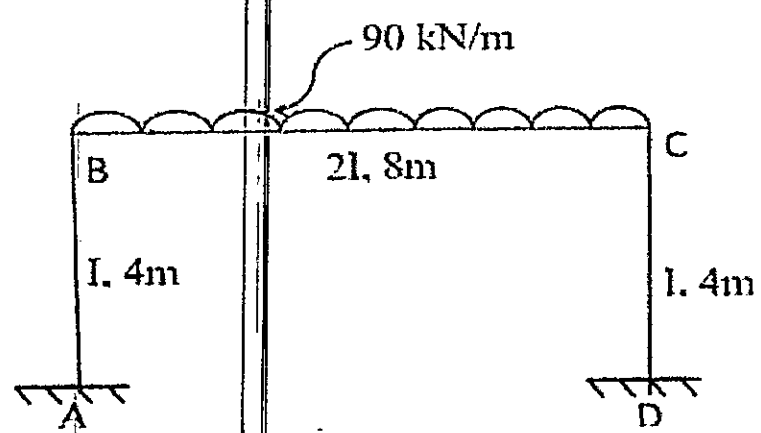### III B.Tech. - I Semester Supple Examinations, March-2025
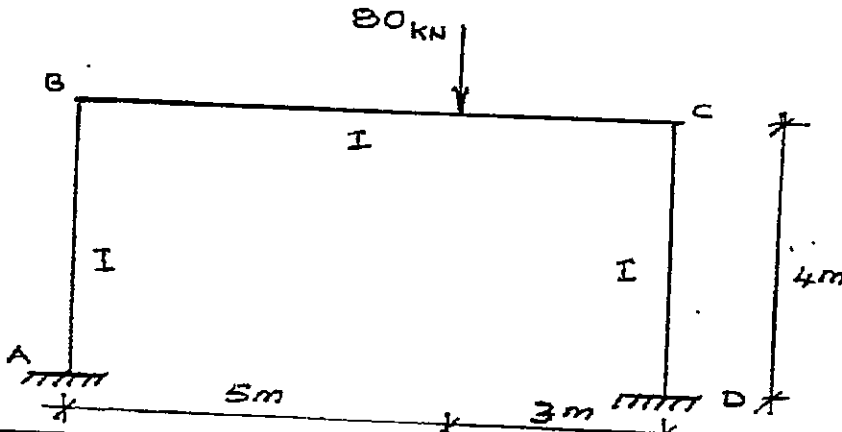### ADVANCED STRUCTURAL ANALYSIS
(CE)

Time: 3 hours
Max. Marks: 70

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

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	A cantilever beam ABC of 4.5m span is fixed at A and free at C, B being the mid-point. The beam is of circular cross-section of 50mm diameter in portion CB and of 100mm diameter in portion AB. The beam is carrying a uniformly distributed load of 20kN/m on its whole length. It is also subjected to a concentrated load of 12kN at its free end C. assume E=220GNm^{-2} . Determine the deflection at the free end using Castigliano's first theorem.	3	1	14M
		OR			
	b	A single bay single storey portal frame ABCD has a span of 6m and height of 6m. It is subjected to a horizontal load of 10 KN (left to right) at B. Both the supports at A and D are fixed. Analyse the portal frame by moment distribution method and draw the bending moment diagram.	3	1	14M
		Unit-II			
2	a	Analyse the portal frame shown in figure. by Kani's method and draw the bending moment diagram. 	3	2	14M
		OR			
	b	Analyse the portal frame in Fig. by Kani's method and draw BMD. 	3	2	14M

		Unit-III			
3	a	A two hinged parabolic arch of span 'l' and rise 'r' carries a UDL of w/meter run over the left hand half of the span. The moment of inertia varies as secant of the slope of rib axis. Derive the expression for the horizontal thrust at the hinges. Calculate the horizontal thrust and Bending moment at quarter span point on the right half of the span if l=20m; r=4m; w=20 KN/m.	3	3	14M
		OR			
	b	A three hinged parabolic arch of span 20 m and rise 5 m carries concentrated loads of 20 KN and 30 KN at distances of 3 m and 7 m from left end and an uniformly distributed load of 25 KN/m on the right half of the span. Determine the horizontal thrust. Also calculate the radial shear, normal thrust and bending moment at a distance of 5 m from left end.	3	3	14M
		Unit-IV			
4	a	Analyze the frame by substitute frame method	3	4	14M
		OR			
	b	Analyse a portal frame of two stroyed, two bay of 5m bay length each and height 5m. A horizontal force of 120kN is applied at top storey and 240kN is applied at lower storey. Use portal frame method	3	4	14M
		Unit-V			
5	a	What are the main functions of stiffening girders in suspension bridges? i)Give the types of significant cable structures ii)What is the degree of indeterminacy of a suspension bridge with two hinged stiffening girder?	3	5	14M
		OR			
	b	The three hinged stiffening girder of a suspension bridge of 110 m is subjected to two point loads of 15 kN each placed at 22 m and 44 m respectively from the left hand hinge.Determine the B.M. and S.F. in the girder at section 33 m from each end. Also determine the maximum tension in the cable which has a central dip of 11 m.	3	5	14M

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

NEC NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CE3107

III B.Tech. - I Semester Supple Examinations, March-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)

QNo		Questions	K L	CO	Marks
		Unit-I			
1	a	Discuss the different sources of solid waste and provide an engineering classification of solid waste.	3	1	7M
		Explain the collection and segregation of E-waste.Describe the regulatory aspects of solid waste management.	2	1	7M
		OR			
	b	What are the principles of sustainable solid waste management, and how do they guide the development of waste management systems?	2	1	14M
		Unit-II			
2	a	Discuss the factors influencing the rate of solid waste generation. How does the frequency of waste generation impact the design of waste management systems?	2	2	14M
		OR			
	b	Explain how waste generation rates can be modeled in urban areas. Discuss the types of data that are essential for developing accurate waste generation models and how this data can improve waste management efficiency.	2	2	14M
		Unit-III			
3	a	Describe the methods adopted in India for collection and transport of solid waste.	2	3	7M
		Explain about the 4R in waste minimization.	2	3	7M
		OR			
	b	Explain the methods of collection system with a flow diagram.	2	3	14M
		Unit-IV			
4	a	Describe the mechanical methods of volume reduction of solid waste.	3	4	14M
		OR			
	b	Discuss the process of thermal volume reduction of solid waste.	2	4	7M
		Describe various types of incinerations and the factors affecting their efficiency.	3	4	7M
		Unit-V			
5	a	Discuss the environmental and health impacts of open dumping.	2	5	7M
		What are the different types of sanitary land fills and explain them in detail.	2	5	7M
		OR			
	b	Explain the role of liners in sanitary landfills.	2	5	7M
		Explain how geo synthetics are used for disposal of waste generated.	2	5	7M

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

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE3101

III B.Tech. - I Semester Supple Examinations, March-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		i)Define an algorithm and discuss its significance in problem-solving. Explain the characteristics of a good algorithm with an example.	K1	1	7M
			ii)Explain the concept of hardware architecture in modern computer systems and describe the function of the CPU, memory, and storage components.	K2	1	7M
			OR			
	b		i)Define data representation in computers and **explain** how integers, floating-point numbers, and characters are represented using different encoding techniques.	K1	1	7M
			ii)Explain the evolution of computer systems through different generations, focusing on the changes in hardware and software architectures.	K2	1	7M
2			**Unit-II**			
	a		i)Explain the usage of string operations and methods like slicing, concatenation, and formatting in Python with suitable examples.	K2	2	7M
			ii)Write a Python program that calculates the area of a rectangle based on user input for length and width using input/output statements.	K3	2	7M
			OR			
	b		i) Explain how the for and while loops work in Python and illustrate their usage with calculating the factorial of a number.	K2	2	7M
			ii) Write a Python program to determine if a number is positive, negative, or zero using a conditional if-else statement, and explain the flow of control.	K3	2	7M
3			**Unit-III**			
	a		i)Define user-defined functions in Python and explain the different types of functions with examples.	K1	3	7M
			ii)Explain the key points to remember when working with lambda functions in Python. Write a Python program that uses a lambda function to multiply two numbers.	K2	3	7M
			OR			
	b		i)Explain the concept of passing parameters to functions in Python. Write a Python function that takes two parameters (length and breadth) and calculates the area of a rectangle.	K2	3	7M
			ii)Write a Python program to find the sum of the first n natural numbers using a recursive function. Explain how recursion works in this case.	K3	3	7M
4			**Unit-IV**			
	a		i)Write a Python program to demonstrate the use of list methods such as append(), remove(), and sort().	K3	4	7M
			ii)Explain the functions and methods associated with sets in Python, such as add(), remove(), union(), and intersection(), with examples.	K2	4	7M

			KL	CO	M
		OR			
	b	i)Write a Python program to demonstrate how to traverse a dictionary and print its keys and values using a loop.	K3	4	7M
		ii)Explain the built-in methods and functions available for working with dictionaries in Python, such as get(), keys(), values(), and demonstrate their usage with examples.	K2	4	7M
5		**Unit-V**			
	a	i)Describe the various types of inheritance in OOPs with suitable examples.	K2	5	7M
		ii)Demonstrate how operator overloading works in OOPs with a code example.	K3	5	7M
		OR			
	b	i)Analyze how abstract classes differ from interfaces in OOPs and provide examples.	K3	5	7M
		ii)Illustrate the concept of polymorphism in OOPs and provide an example.	K1	5	7M

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

Subject Code: R20EE3102

III B.Tech. - I Semester Supple Examinations, March-2025
POWER ELECTRONICS
(EEE)

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
			Unit-I			
1	a		Derive and analyze the dynamic characteristics of SCR with relevant expressions?	4	1	7M
			Explain in detail about the snubber circuit by deriving output expressions?	4	1	7M
			OR			
	b		Compare the outcomes of various methods of SCR triggering?	4	1	7M
			Derive and analyze the characteristics of IGBT with necessary equations?	4	1	7M
			Unit-II			
2	a		Describe the principle of operation of half wave controlled converter with RL load?	4	2	7M
			A 200V, 50Hz, one pulse SCR controlled converter is triggered at a firing angle of 45 degrees and the load current extinguishes at an angle of 205 degrees. Calculate the circuit turn off time, average output voltage and the average load current for a) R= 5.6 ohms and L= 2.3mH. b) R= 5.6 ohms, L=2.3mH and E=106V?	4	2	7M
			OR			
	b		Elaborate the fully controlled midpoint converter with resistive load by using circuit diagram and waveforms?	4	2	7M
			A single phase transformer, with secondary voltage of 220V, 50Hz delivers power to load R=11.4 ohms through a half wave controlled rectifier circuit. For a firing angle delay of 65 degrees, find the rectification efficiency, form factor, voltage ripple factor, transformer utilization factor and the PIV of the thyristor?	4	2	7M
			Unit-III			
3	a		Derive the average load voltage of three pulse converter with RL load with necessary equations?	3	3	7M
			Compare the effect of source inductance on single phase and three phase converters with relevant relations?	3	3	7M
			OR			
	b		Describe the working principle and compare the output waveforms of single phase and three phase dual converters?	3	3	14M
4			**Unit-IV**			
	a		Describe the working principle of bidirectional converters with output waveforms?	3	4	7M
			A single phase voltage controller has input voltage of 210V, 50Hz and a load of R=14.7 ohms for 6 cycles ON and 4 cycles OFF. Find the RMS output voltage, input power factor the average and RMS thyristor currents?	3	4	7M

			KL	CO	M
		OR			
	b	Derive and analyze the RMS load voltage of single phase AC voltage controllers with waveforms?	3	4	7M
		Explain in detail about the single phase bridge configuration of cyclo converters with inductive load?	3	4	7M
5		**Unit-V**			
	a	Elaborate the operation of buck converter by using chopper circuit? Draw the waveforms also.	4	5	7M
		Draw the circuit diagram and analyze the single phase inverter operation?	4	5	7M
		OR			
	b	Elaborate the operation of boost converter by using chopper circuit? Draw the waveforms also.	4	5	7M
		Explain in detail about the phase displacement control along with objectives and outcomes?	4	5	7M

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

Subject Code: R20EE3103

III B.Tech. - I Semester Supple Examinations, March-2025
POWER GENERATION AND TRANSMISSION
(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
		Unit-I			
1	a	i) Explain the factors affecting the selection of site for a hydroelectric power plant.	K2	1	4M
		ii) Explain the construction and the working of thermal power plant with a neat diagram.	K2	1	10M
		OR			
	b	i) Explain the working of nuclear power plant with a line diagram.	K2	1	10M
		ii)List the risks involved in using nuclear energy	K2	1	4M
		Unit-II			
2	a	i) Explain the concept of Solar radiation at the earth's surface.	K2	2	7M
		ii) Explain with a neat sketch the working of a wind energy conversion system	K2	2	7M
		OR			
	b	i)Explain the basic principle of tidal power generation	K2	2	7M
		ii)Explain about Potential of Geothermal resources in India.	K2	2	7M
		Unit-III			
3	a	i)Clearly explain what do you understand by GMR and GMD of a transmission line?	K2	3	7M
		ii)Consider a single conductor and derive its flux linkages due to internal flux?	K2	3	7M
		OR			
	b	i)Explain the effect of earth on the capacitance of a transmission line by using the method of images.	K2	3	7M
		ii)Calculate the capacitance per phase of a three phase three wire transposed system when the conductors are arranged at the corners of a triangle having sides of 1.0 m, 1.5 m and 2.0 m. Diameter of each conductor is 1.2 cm.	K3	3	7M
		Unit-IV			
4	a	i)Draw the phasor diagram of a short transmission line and derive an expression for voltage regulation	K3	4	7M
		ii)Determine the regulation of a 3-phase, 100 km, 50 Hz transmission line delivering 20 MW at a p.f. of 0.8 lagging and 66 kV to a balanced load. The conductors are of copper, each having resistance 0.1 ohm per km, 1.5 cm outside diameter, spaced equilaterally 2 metres between centres. Neglect leakance and use nominal-π method.	K3	4	7M
		OR			
	b	i)Starting from first principles deduce expressions for ABCD constants of a long line in terms of its parameters.	K2	4	7M
		ii)What are various parameters of a transmission line and how they are considered for different lines?	K2	4	7M

Unit-V

			KL	CO	M
5	a	i)Deduce the expression for calculating sag of an overhead line when the supports are at equal level.	K2	5	7M
		ii)Each conductor of a 33 kV, three phase system is suspended by a string of three similar insulators. The capacitance between each insulator pin and earth is 13% of self capacitance of each insulator. Find (i) the distribution of voltage over three insulators and (b) string efficiency.	K3	5	7M
		OR			
	b	i)Derive an expression for electric stress in a single core cable.	K2	5	7M
		ii)A single phase transmission consists of two conductors of diameter 1.2 cm each, with 1.5 m spacing between centres. Determine the value of the line voltage at which corona commences, if the disruptive critical voltage for air is 21.21 kV/cm.	K3	5	7M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EE3107

III B.Tech. - I Semester Supple Examinations, March-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	KL	CO	M
		Unit-I			
1	a	Explain the following terms i) Time shifting ii) Time scaling iii) Time Reversal iv) Amplitude scaling v) Energy & power signals	4	1	14M
		OR			
	b	Explain the following terms i) Sinusoidal function ii) Exponential function iii) Gate function iv) Triangular function v) Signum function	4	1	14M
		Unit-II			
2	a	i) Derive the necessary expression to represent the function f(t) using Trigonometric Fourier series?	3	2	7M
		ii) Bring out the relationship between Trigonometric and Exponential Fourier series?	3	2	7M
		OR			
	b	i) List out the Dirichlet's conditions of Fourier series?	3	3	7M
		ii) State the any four properties of Fourier series?	3	2	7M
		Unit-III			
3	a	i) State all the properties of Fourier series?	3	3	7M
		ii) Compute the Fourier transform of $f(t) = Sin (\pi t/2) + Cos(t)$?	3	3	7M
		OR			
	b	i) Determine the Fourier transform of a two sided exponential pulse $X(t) = e^{-a|t|}$	3	3	7M
		ii) Find the Fourier transform of an even function $X_e(t)$ and odd function $X_0(t)$ of X(t)?	3	3	7M
		Unit-IV			
4	a	i) Differentiate between signal bandwidth and system bandwidth?	2	4	7M
		ii) Explain how input and output signals are related to impulse response of a LTI system?	3	4	7M
		OR			
	b	i) Bring out the relation between bandwidth and rise time?	4	4	7M
		ii) What are the requirements to be satisfied by an LTI system to provide distortion less transmission of a signal??	3	4	7M
		Unit-V			
5	a	i) Explain the Impulse sampling?	2	5	7M
		ii) Discuss the effect of Aliasing due to under sampling?	3	5	7M
		OR			
	b	Discuss the following i) Sampling theorem ii) Natural and flattop sampling	4	5	14M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME3101

III B.Tech. - I Semester Supple Examinations, March-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)

QNo			Questions	K L	CO	Marks
1	a		**Unit-I**			
			Discuss the structure of agents in artificial intelligence.	2	1	7M
			Discuss how historical developments have shaped the foundation of AI	2	1	7M
			OR			
	b		Explain the concept of rationality in the context of intelligent agents.	2	1	7M
			Describe the process of problem formulation in artificial intelligence.	2	1	7M
2	a		**Unit-II**			
			Explain how uniform cost search (UCS) algorithm works and how it differs from BFS	2	2	7M
			Discuss how greedy search selects nodes for expansion and its potential drawbacks.	2	2	7M
			OR			
	b		Discuss the optimality of the A* search algorithm. Explain under what conditions A* is guaranteed to find the optimal solution	2	2	14M
3	a		**Unit-III**			
			Compare and contrast different knowledge representation (KR) models used in artificial intelligence.	4	3	7M
			Explain the concept of logic programming in artificial intelligence. Discuss how logic programming languages are used to represent and manipulate knowledge.	2	3	7M
			OR			
	b		Compare and contrast numerical, string, list, tuple, and dictionary data types. Give Examples	4	3	7M
			Describe how data manipulation is performed using NumPy, Pandas, and Matplotlib libraries in Python for machine learning.	2	3	7M
4	a		**Unit-IV**			
			Define machine learning and discuss its significance in contemporary applications.	2	4	7M
			Differentiate between supervised and unsupervised learning algorithms. Discuss the characteristics and applications	2	4	7M
			OR			
	b		Discuss the concepts of unsupervised learning, including clustering, density estimation, and dimensionality reduction. Explain the objectives and applications of each technique.	2	4	14M
5	a		**Unit-V**			
			Compare and contrast classification and regression algorithms in machine learning.			7M
			Explain the k-nearest neighbors (KNN) algorithm and its use in machine learning.			7M

		OR			
	b	Describe the k-means clustering algorithm and its application in unsupervised learning.			7M
		Explain the concept of support vector machines (SVM) and their use in both classification and regression tasks.			7M

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

NARASARAOPETA
NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME3102

III B.Tech. - I Semester Supple Examinations, March-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
			Unit-I			
1	a		Explain the Rankine cycle with a schematic layout. Include a thermodynamic analysis of the cycle.	K3	CO1	7M
			A steam power plant operates on a Rankine cycle with superheating. Steam enters the turbine at 3 MPa and 350°C and is condensed in the condenser at 50 kPa. Determine the thermal efficiency of the cycle and the network output per unit mass of steam.	K3	CO1	7M
			OR			
	b		Explain the principles of combustion, including types of fuels and the concept of adiabatic flame temperature.	K2	CO2	7M
			For a combustion process, methane (CH_4) is burned with 20% excess air. Determine the theoretical air required per kg of methane and the flue gas composition on a dry basis.	K3	CO2	7M
			Unit-II			
2	a		Classify boilers and explain the working principles of both LP and HP boilers with the help of diagrams.	K3	CO2	7M
			A boiler operates at 80% efficiency and produces 8,000 kg of steam per hour. If the feed water enters at 50°C and steam is generated at 1.5 MPa and 300°C, calculate the amount of heat required per hour and the equivalent evaporation.	K3	CO2	7M
			OR			
	b		Define draught and explain how the height of a chimney is determined for a given draught and discharge.	K3	CO2	14M
			Unit-III			
3	a		What is a steam nozzle, and what are its functions and applications? Explain different types of nozzles used in steam turbines.	K2	CO3	7M
			Calculate the exit velocity of steam in a convergent-divergent nozzle when steam expands from 2 MPa and 300°C to an exit pressure of 0.1 MPa. Assume isentropic expansion and neglect inlet velocity.	K3	CO3	7M
			OR			
	b		A nozzle is designed to expand steam from 1.5 MPa to 0.2 MPa. Given that the steam enters the nozzle at 300°C, calculate the mass flow rate through the nozzle if the exit area is 0.01 m² and the exit velocity is 600 m/s.	K3	CO3	14M
4			**Unit-IV**			
	a		Classify steam turbines and explain the mechanical details of an impulse turbine. Draw a velocity diagram and discuss its efficiency.	K3	CO4	7M
			Explain the working principles of reaction turbines and draw the velocity diagram for Parson's reaction turbine.	K4	CO4	7M

		OR			
		Describe the De-Laval turbine and the methods used to reduce rotor speed in these turbines.	K3	CO4	7M
	b	In a De-Laval turbine, steam enters at 2.5 MPa and 400°C and expands to 0.1 MPa. If the mass flow rate is 1 kg/s and the nozzle efficiency is 90%, calculate the power output and final velocity of steam at the exit.	K3	CO4	7M
		Unit-V			
		Describe a simple gas turbine plant with an ideal cycle and explain the components involved.	K3	CO5	7M
5	a	In a gas turbine with regeneration, the pressure ratio is 6, and the maximum and minimum temperatures are 1400 K and 300 K, respectively. Calculate the thermal efficiency with and without regeneration.	K4	CO5	7M
		OR			
		Define thrust, thrust power, and propulsion efficiency. Analyse the performance needs that turbojet engines meet.	K4	CO5	7M
	b	In an ideal Brayton cycle, air enters the compressor at 100 kPa and 300 K, and is compressed to 1 MPa. The maximum temperature in the cycle is 1500 K. Calculate the thermal efficiency of the cycle and the network output per kg of air.	K3	CO5	7M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20ME3103

III B.Tech. - I Semester Supple Examinations, March-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)

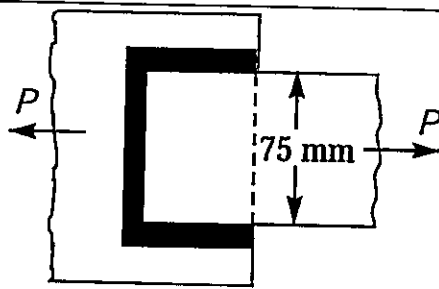| Q. No		Questions	K L	CO	Marks
		Unit-I			
1	a	**i)** Define the following properties of a material : (i) Ductility, (ii) Toughness, and (iii) Hardness	K2	CO1	7M
		ii) Explain factors to be considered for the selection of materials for the design of machine elements.	K2	CO1	7M
		OR			
	b	A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to 1. Maximum principal stress 2. Maximum shear stress; and 3. Maximum distortion strain energy theory of yielding	K3	CO1	14M
		Unit-II			
2	a	A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value of 50 kN. Determine the diameter of bar by taking a factor of safety of 1.5, size effect of 0.85, surface finish factor of 0.9. The material properties of bar are given by: ultimate strength of 650 MPa, yield strength of 500 MPa and endurance strength of 350 MPa.	K3	CO2	14M
		OR			
	b	**i)** Write Soderberg's equation and state its application to different type of loadings.	K2	CO2	7M
		ii) A leaf spring in an automobile is subjected to cyclic stresses. The average stress = 150 MPa; variable stress = 500 MPa; ultimate stress = 630 MPa; yield point stress = 350 MPa and endurance limit = 150 MPa. Estimate, under what factor of safety the spring is working, by Goodman and Soderberg formulae.	K3	CO2	7M
		Unit-III			
3	a	A double riveted lap joint with chain riveting is to be made for joining two plates 10 mm thick. The allowable stresses are: σ_t = 60 MPa ; τ = 50 MPa and σ_c = 80 MPa. Find the rivet diameter, pitch of rivets and distance between rows of rivets. Also find the efficiency of the joint.	K3	CO3	14 M
		OR			
	B	**i)** A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in *Fig.1.* The maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to both static and fatigue loading.	K3	CO3	7M

Fig.1

		ii) Explain the term welded joint and also lists the assumptions made in the design of welded joint.		K2	CO3	7M

Unit-IV

4	a	A 45 mm diameter shaft is made of steel with a yield strength of 400 MPa. A parallel key of size 14 mm wide and 9 mm thick made of steel with a yield strength of 340 MPa is to be used. Find the required length of key, if the shaft is loaded to transmit the maximum permissible torque. Use maximum shear stress theory and assume a factor of safety of 2.	K3	CO4	14 M

OR

	b	Explain the design procedure for the Sleeve and cotter joint.		K2	CO4	14M

Unit-V

5	a	Design and make a neat dimensioned sketch of a muff coupling which is used to connect two steel shafts transmitting 40 kW at 350 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa. Take Width of key as 18 mm.	K4	CO5	14M

OR

5	b	**i)** Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5.	K3	CO5	7M
		ii) A solid circular shaft is subjected to a bending moment of 3000 N-m and a torque of 10,000 N-m. The shaft is made of 45C8 steel having ultimate tensile stress of 700 MPa and a ultimate shear stress of 500 MPa. Assuming a factor of safety as 6, determine the diameter of the shaft.	K3	CO5	7M

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

Subject Code: R20EC3101

III B.Tech I Semester Supple. Examinations, March-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	K L	CO	Marks
		Unit-I			
1	a	i. List out the ideal characteristics of Op-Amp. Derive the gain for inverting op-amp.	K4	CO1	7M
		ii. Explain in detail the AC characteristics of the OP-AMP.	K1	CO1	7M
		OR			
	b	i. With a neat circuit diagram, explain the working of the Integrator using Op-Amp. Derive output voltage equations for the same.	K4	CO1	7M
		ii. With a neat circuit diagram, explain the working of the Square wave generators using Op-Amp.	K4	CO1	7M
		Unit-II			
2	a	i. Explain the following characteristics of DAC with examples Resolution, accuracy, and linearity.	K2	CO2	7M
		ii. Explain the operation of the Binary weighted Resister DAC with a neat diagram.	K3	CO2	7M
		OR			
	b	i. What are the applications of the 555 Timer? Explain the operation of a monostable multivibrator using 555 Timer.	K2	CO2	7M
		ii. Explain the operation of Successive Approximation ADC with a neat illustration.	K3	CO2	7M
		Unit-III			
3	a	i. Draw the circuit of a 2nd order low pass filter and derive its transfer function.	K4	CO3	7M
		ii. Explain the principle of operation of a phase-locked loop (PLL) with a neat diagram.	K2	CO3	7M
		OR			
	b	i. What are the applications of Filters? Draw the Frequency response characteristics of LPF, HPF, BPF, and BRF and explain briefly.	K2	CO3	7M
		ii. Derive the voltage gain equations for Low Pass Filter and High Power Filter.	K3	CO3	7M
		Unit-IV			
4	a	i. State the important characteristics of the TTL logic family. Implement OR gate using CMOS logic.	K3	CO4	7M
		ii. Mention three advantages of CMOS over the TTL digital logic families. Draw the circuit diagram and explain the workings of the TTL inverter.	K3	CO4	7M
		OR			
	b	i. Design a CMOS NAND gate.	K3	CO4	7M
		ii. Compare CMOS, TTL, and ECL logics.	K4	CO4	7M

5		**Unit-V**			
	a	i. Define Encoder. Construct an 8x3 encoder using logic gates and a truth table.	K3	CO5	7M
		ii. Draw and explain the 4-bit universal shift register with its timing diagram.	K2	CO5	7M
		OR			
	b	i. Define Multiplexer. Construct 16:1 Multiplexer using 4:1 Multiplexers.	K3	CO5	7M
		ii. Draw and explain the 4-bit bi-directional shift register with its timing diagram.	K2	CO5	7M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC3102

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
			Unit-I			
1	a		i) Explain radiation pattern in short dipole.	K4	1	7M
			ii)Explain relation between effective area and maximum directivity.	K3	1	7M
			OR			
	b		i) Explain current distribution on a thin wire antenna.	K3	1	7M
			ii)Explain directivity and gain for single wire antenna.	K3	1	7M
			Unit-II			
2	a		i) What is meant by retarded potentials? Explain.	K3	2	7M
			ii)State reciprocity theorem and explain its use in antennas.	K4	2	7M
			OR			
	b		Explain about Radiation from a half-wave dipole.	K4	2	14M
			Unit-III			
3	a		i) Explain about Broad side array.	K3	3	7M
			ii)Derive the expression for field strength of a uniform linear array.	K3	3	7M
			OR			
	b		i) Explain about ordinary End fire array.	K3	3	7M
			ii)Derive the expression for array factor of two-element array.	K3	3	7M
			Unit-IV			
4	a		i) Explain the operation of helical antenna in axial mode.	K3	4	7M
			ii)What is Rhombic antenna? Write the salient features of it.	K3	4	7M
			OR			
	b		i) Define microstrip antenna. Write its advantages and applications of it.	K3	4	7M
			ii)Explain the basic principle of lens antenna and write the applications of lens antenna.	K4	4	7M
			Unit-V			
5	a		i) Explain about ionospheric abnormalities.	K3	5	7M
			ii)Derive the expression for field strength due to space wave.	K4	5	7M
			OR			
	b		i) Explain about tropospheric scattering.	K3	5	7M
			ii)Write the salient features of ground wave propagation.	K3	5	7M

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC3103

III B.Tech. - I Semester Supple Examinations, March-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)

Q.No			Questions	K L	CO	Marks
			Unit-I			
1	a		Determine the stability for the following systems: i) $h(n) = 2^n u(n)$ ii) $h(n) = 5^n u(3-n)$	III	1	7M
			Find the impulse response $h[n]$ of the system described by the difference equation $8y(n) + 6y(n-1) = x[n]$	III	1	7M
			OR			
	b		Determine the free response of the system described by the difference equation $y(n) = 5/6\ y(n-1) + 1/6\ 6\ y(n-2) = x(n)$ with $y(-1) = 1$ and $y(-2) = 0$.	III	1	7M
			State and prove circular convolution property of DFT.	II	1	7M
			Unit-II			
2	a		Find the DFT of a sequence $x(n) = \{1, 1, 0, 0\}$ and find the IDFT of $Y(k) = \{1, 0, 1, 0\}$.	III	2	7M
			Compute the DFT of the three-point sequence $x(n) = \{2, 1, 2\}$. Using the same sequence, compute the 6-point DFT and compare the two DFTs.	II	2	7M
			OR			
	b		Give the steps involved in implementing Radix –2, DIT FFT algorithm.	II	2	14M
			Unit-III			
3	a		List out the characteristics of FIR digital filters.	II	3	7M
			Explain the need for the use of window sequence in the design of FIR filter. Describe the window sequence generally used and compare the properties.	II	3	7M
			OR			
	b		Obtain the direct form I and direct form II structures for the system described by the difference equation $y(n) = -0.1\ y(n-1) + 0.72\ y(n-2) + 0.7\ x(n) - 0.252\ x(n-2)$.	III	3	7M
			Explain the design procedure for IIR filters using Butterworth approximations.	II	3	7M
			Unit-IV			
4	a		Design a Chebyshev filter with a maximum pass band attenuation of 2.5 dB at a frequency of 20 rad/sec and the stop band attenuation of 30 dB at a frequency 50 rad/sec.	III	4	7M
			Explain quantitatively about the design of IIR filter using Bilinear transformation method.	II	4	7M
			OR			
	b		With an example explain the design procedure for Butterworth filter.	II	4	7M
			Explain the differences between Direct form-I and Direct form-II structures.	II	4	7M
5			**Unit-V**			
	a		What are the characteristics of linear phase FIR digital filters?	II	5	7M
			Design an FIR digital low pass filter with cutoff frequency 1.2 radian and length $N = 7$. Use frequency sampling method.	III	5	7M

		OR			
	b	Design a linear phase lowpass FIR filter with a cutoff frequency of $\pi/4$ rad/sec using frequency sampling technique. Take N = 7.	III	5	7M
		Design a high pass filter using hamming window with a cutoff frequency of 1.2 radians/sec and N=9	III	5	7M

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

NARASARAOPETA NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20EC3106

III B.Tech. - I Semester Supple Examinations, March-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)

QNo			Questions	K L	CO	M
			Unit-I			
1	a		i. List out the dynamic characteristics of the measurement system in detail.	K1	CO1	7M
			ii. A. A circuit was tuned for resonance by 10 different students and the values of resonant frequency in KHz were recorded as 534, 548, 588, 577, 540, 545, 580, 555, 590, and 600. Calculate a) Mean b) Average deviation c) Standard Deviation. B. Illustrate the difference between precision and accuracy.	K3	CO1	7M
			OR			
	b		i) Explain briefly the following terms (i) linearity, (ii) resolution (iii) Accuracy.	K4	CO1	7M
			ii. Explain the functional elements of the measurement system with a neat block diagram.	K2	CO1	7M
			Unit-II			
2	a		i. Explain in detail the principle, workings, and features of Linear variable differential Transducer (LVDT) with a neat sketch.	K2	CO2	7M
			ii. Write short notes on the Thermocouple.	K1	CO2	7M
			OR			
	b		i. Explain how to measure pressure using a resistive-type transducer.	K3	CO2	14M
			ii. Write short notes on the Strain Gauge.	K1	CO2	
			Unit-III			
3	a		i. Explain the Wien Bridge with a neat diagram in detail.	K2	CO3	7M
			ii. Explain a bridge that is used for the inductance measurement.	K3	CO3	7M
			OR			
	b		i. Explain the Kelvin double Bridge with a neat diagram in detail.	K2	CO3	7M
			ii. A PMMC ammeter gives a reading of 20 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 1 K, 50 Hz supply. Determine the capacitance.	K3	CO3	7M
			Unit-IV			
4	a		i. Explain the use of Heterodyning in a spectrum analyzer along with its circuit diagram.	K3	CO4	7M
			ii. Write short notes on the AC voltmeters.	K2	CO4	7M
			OR			
	b		i. Explain the working principle and application of a Harmonic Distortion Analyzer.	K3	CO4	7M
			ii. Write short notes on the Wave Analyzer.	K2	CO4	7M

		Unit-V			
5	a	i. Draw the block diagram of the X-Y recorder and explain each block briefly.		CO5	7M
		ii. Write a detailed technical note on the Dot Matrix display.		CO5	7M
		OR			
	b	i. With a neat diagram, explain the basic components and working principles of Cathode Ray Oscilloscopes.		CO5	7M
		ii. With a neat diagram, explain the basic components and working principles of magnetic tape recorders.		CO5	7M

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

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

R20

Sub Code: R20CY3101

CRYPTOGRAPHY & NETWORK SECURITY

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
			Unit-I			
1	a		i)Differentiate different Passive and Active Attack quoting examples.	K1	1	7M
			ii)Differentiate between substitution and transposition techniques quote some techniques and solve the following: Decrypt the given Cipher Text "THTIPPNTOYENCGIRGRRSEYAIS" using the key=456213 with Columnar Transposition Technique.	K5	1	7M
			OR			
	b		i)Use PlayFair Cipher to Encrypt the Plain Text "This is tapped" using the Key "Government"	K5	1	7M
			ii)Explain the 5 Objectives of Computer Security	K1	1	7M
			Unit-II			
2	a		i)This problem provides a numerical example of encryption using a one-round version of DES.We start with the same bit pattern for the key and the plain-text, namely:Hexadecimal 0 1 2 3 4 5 6 7 8 9 A B C D E F the corresponding binary notation 0000 0001 0010 0011 0100 0101 0110 0111 1000 1001 1010 1011 1100 1101 1110 1111 .Derive K after permutation choice1	K3	2	7M
			ii)How Mix columns and AddRoundKey operations in AES algorithm can be performed with a suitable example.	K2	2	7M
			OR			
	b		i)Explain encryption and decryption process of ECB and CBC Block cipher modes of operation with block diagram	K1	2	7M
			ii)Illustrate the tasks performed in a Single Round of DES algorithm with block diagram.	K2	2	7M
			Unit-III			
3	a		i)Quote the principles of Fermat's theorem over the prime number p. Solve the $\theta(50)$.	K5	3	7M
			ii)Give the principles of public key cryptography?Write any Four differences between public key and private key?	K2	3	7M
			OR			
	b		i) In a public-key system using RSA, you intercept the cipher text C = 52 sent to a user whose public key is e = 13, n = 143. What is the plaintext M?	K5	3	7M
			ii)Two persons named Alice and Bob, wish to setup a common secret key between them using the Diffie-hellman key exchange algorithm where they agree on 17 as the prime number and 5 as the primitive root. Alice chooses 4 as his secret key and Bob chooses 6. Find their shared secret key .Explain along with the algorithm step by step.	K5	3	7M
			Unit-IV			
4	a		i)Explain about the round function in SHA-512 with neat diagram	K2	4	7M
			ii)Elaborate about MACs based on BLOCK CIPHERS.	K1	4	7M

			KL	CO	M
		OR			
	b	i)Explain about the design objectives of HMAC	K2	4	7M
		ii)Illustrate about Generic model of digital signatures with detail diagrammatic information.	K2	4	7M
5		Unit-V			
	a	i)In S/MIME, explain how Bob and Alice exchange the secret key for encrypting messages.	K3	5	7M
		ii)How is an X.509 certificate revoked?	K1	5	7M
		OR			
	b	i)What is the difference between an SSL connection and an SSL session and also list the parameters that defines SSL connection and session.	K1	5	7M
		ii)Give an illustration on how firewall works and gives details description with neat sketch.	K3	5	7M

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

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2

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CS3105

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
			Unit-I			
1	a		Compare and Contrast compiler and an interpreter.	4	1	4M
			Explain the phases of compiler	2	1	10M
			OR			
	b		Develop the transition diagram for Reserved Words and Identifiers, Unsigned numbers and white spaces with neat sketch	3	1	14M
			Unit-II			
2	a		Explain the FIRST and FOLLOW with example		2	7M
			Explain the role the parser in detail	2	2	7M
			OR			
	b		Convert the following grammar into LL(1) grammar and construct the LL(1) Parsing table: E->TE1 ; E1->+TE1 / ε ; T ->FT1 ; T1-> * FT1 / ε ; F ->(E)/ id	3	2	14M
			Unit-III			
3	a		Parse the input string **int id,id;** using shift-reduce parser for the grammar S -> TL; T -> int | float L -> L,id | id	3	3	7M
			Explain the process of handling "Dangling-ELSE" ambiguity.	2	3	7M
			OR			
	b		Write the steps for the efficient construction of LALR parsing table. Explain with an example.	2	3	7M
			Compute closure(I) and goto(I) for the grammar S -> Aa| bAc| Bc| bBa A -> d B -> d	3	3	7M
			Unit-IV			
4	a		Construct Syntax tree to evaluate the expression 2+3*4, through SDD	3	4	7M
			Develop the quadruple, triple, indirect triple for the expression a = b * − c + b * − c.	3	4	7M
			OR			
	b		Construct the syntax tree and draw the DAG for the expression (a*b) + (c-d) * (a*b) + b.	3	4	7M
			Discuss about Intermediate code representation	2	4	7M
			Unit-V			
5	a		What is Peephole optimization? Explain its characteristics.	2	5	7M
			Discuss in detail the role of dead code elimination and strength reduction during code optimization of a compiler.	2	5	7M
			OR			
	b		Construct basic blocks, data flow graph and identify loop invariant statements for factorial of a given number	3	5	14M

Subject Code: R20IT3103

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
			Unit-I			
1	a		Design a DFA that accepts the language over Σ = {a, b} of all strings that contain the sub-string either aa or bb.	K3	CO1	7M
			Write a procedure to combine two NFA?s into a single NFA. The operations to be performed are those of concatenation, union and closure.	K3	CO1	7M
			OR			
	b		Explain the role of Lexical analysis phase. And identify the process of input buffering technique with example.	K3	CO1	7M
			Discuss about equivalence of NFA and DFA with an examples.	K3.	CO1	7M
2			**Unit-II**			
	a		Explain the procedure for eliminating ambiguity and eliminating left recursion from a grammar. Give an example	K2	CO2	7M
			Compute FIRST and FOLLOW for the grammar: $E \to T E', E' \to + T E' / \varepsilon, T \to F T', T' \to * F T' / \varepsilon, F \to (E) \mid id$	K2	CO2	7M
			OR			
			What is meant by a parser generator? Illustrate with example.	K3	CO2	5M

	b		Generate the three-address code for the following "C" program fragment:
			while(a > b)
			{
			if (c < d) x = y + z;
			else x = y - z;
			}
				K3	CO2	9M

3			**Unit-III**			
	a		Let synthesized attribute, Val give the value of the binary number generated by S in the following grammar. For example, on input 101.101, S.Val = 5.625. $S \to L \cdot L \mid L$ $L \to LB \mid B$ $B \to 0 \mid 1$ Write synthesized attribute values corresponding to each of the productions to determine the S.Val.	K3	CO2	10M
			What are L-attributed definitions? Explain with an example.	K3	CO2	4M
			OR			
	b		List the differences between LR and LL Parsers. Give Various types of LR Parsers	K3	CO3	7M
			Construct SLR Parsing table for the grammar $E \to E + T \mid T, T \to T * F \mid F, F \to (E) \mid id$ by giving LR(0) items.	K3	CO3	7M
4			**Unit-IV**			
	a		What is dependency graph? Construct dependency graph for the expression a-4+c using syntax directed definition of $E \to TE^1, E^1 \to +TE^1/-TE^1/\varepsilon, T \to (E)/id/num$	K2	CO4	8M
			Differentiate inherited and synthesized attributes with an example.	K2	CO4	7M

		OR			
	b	Discuss syntax directed definition by defining synthesized and inherited attributes. Construct a SDD of a simple desk calculator.	K2	CO4	7M
		What are the different storage allocation strategies? Explain run time storage allocation by activation trees.	K2	CO4	7M
5		**Unit-V**			
	a	Explain Principle sources of Optimization	K3	CO5	7M
		Write short notes on basic blocks by giving structure preserving transformation.	K3	CO5	7M
		OR			
	b	Explain the following (a) Copy Propagation (b) Dead-Code Elimination (c) Code Motion (d) Reduction in Strength.	K3	CO5	10M
		Explain about Data-Flow analysis of structured flow graphs.	K3	CO5	4M

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

Subject Code: R20IT3104

III B.Tech. - I Semester Supple Examinations, March-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
			Unit-I			
1	a		i) Explain all the methods of Servlet Interface with an example program.	K4	CO1	7M
			ii) Implement a Servlet by extending HttpServlet and write the deployment descriptor also.	K3	CO1	7M
			OR			
	b		i) Explain the use of RequestDispatcher interface in servlets.	K4	CO1	7M
			ii) Illustrate how session tracking can be done with cookies.	K4	CO1	7M
			Unit-II			
2	a		i) Explain what are the advantages of JSPs.	K4	CO2	7M
			ii) Sketch how JSP processing can be done.	K3	CO2	7M
			OR			
	b		i) Interpret all the JSP implicit objects.	K2	CO2	7M
			ii) Explain all the JSP scripting elements.	K4	CO2	7M
			Unit-III			
3	a		i) Summarize the concept of Error Handling in JSP.	K2	CO3	7M
			ii) Explain how control is passed between JSP pages.	K4	CO3	7M
			OR			
	b		i) Determine how data can be passed between JSP pages and explain.	K3	CO3	7M
			ii) Summarize different scopes of JSP objects.	K2	CO3	7M
			Unit-IV			
4	a		i) Explain JDBC Architecture in detail with a diagram.	K4	CO4	7M
			ii) Implement a JSP which can retrieve the data from the database.	K3	CO4	7M
			OR			
	b	Explain all the JDBC Drivers in detail with diagrams.		K4	CO4	14M
			Unit-V			
5	a		i) Interpret all the three types of arrays in PHP.	K2	CO5	7M
			ii) Summarize different Math functions present in PHP.	K2	CO5	7M
			OR			
	b		i) Explain the concept of Form Validation in PHP.	K4	CO6	7M
			ii) Implement the PHP script to create the database in MySQL database.	K3	CO6	7M

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

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

| R20 |

Sub Code: R20DS3102

BIG DATA ANALYTICS

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
		Unit-I			
1	a	i) Define Hadoop. List the building blocks of the Hadoop ecosystem?	K1	CO1	7M
		ii) Distinguish between standalone mode and distributed mode	K2	CO1	7M
		OR			
	b	i) Compare and contrast the Google File System with Hadoop's distributed file system.	K2	CO1	7M
		ii) Explain the steps involved in setting up SSH authentication for a Hadoop cluster	K1	CO1	7M
		Unit-II			
2	a	i) Write a MapReduce job to calculate the average temperature for each year for the weather dataset.	K3	CO2	14M
		OR			
	b	i) Differentiate between the old and new Java MapReduce APIs and their execution flow.	K2	CO2	7M
		ii) Describe the functions of both the Map phase and the Reduce phase in a MapReduce job.	K1	CO2	7M
		Unit-III			
3	a	i)Write a Spark program to create and pass functions.	K3	CO3	7M
		ii) What is an RDD in Apache Spark, and why is it essential?	K1	CO3	7M
		OR			
	b	i) Discuss the performance trade-offs of different persistence levels in RDDs	K4	CO3	7M
		ii) Examine the differences between the map() and flatMap() transformations in Spark RDDs.	K4	CO3	7M
		Unit-IV			
4	a	i) Write about various categories of operators supported by PIG	K1	CO4	7M
		ii) Explain the basic steps to execute a Pig script in Hadoop's distributed mode?	K2	CO4	7M
		OR			
	b	i) Analyze the scenarios where Pig is more advantageous compared to MapReduce, and evaluate its limitations.	K4	CO4	14M
		Unit-V			
5	a	i) Write a HiveQL query to load data into a table from a CSV file and run a basic aggregation query.	K3	CO5	7M
		ii) Explain in detail about the data types in HIVE	K2	CO5	7M
		OR			
	b	i)Write a HiveQL query to insert and delete into a table.	K3	CO5	7M
		ii) Analyze the importance of partitions and bucketing in Hive tables for improving query performance.	K4	CO5	7M

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

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NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20AI3105

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
1	a		**Unit-I**			
			Define a learning system and detail its primary components.	K2	CO1	7M
			What signifies a Vapnik-Chervonenkis (VC) Dimension in the context of supervised learning?	K3	CO1	7M
			OR			
	b		Discuss the concept of Probably Approximately Correct (PAC) Learning. How does it contribute to model reliability?	K1	CO1	7M
			Describe how noise can affect the outcomes of a supervised learning model.	K2	CO1	7M
2	a		**Unit-II**			
			Explain Bayesian Decision Theory and its significance in classification.	K2	CO2	7M
			Discuss the principles of Utility Theory and how they apply to machine learning.	K1	CO2	7M
			OR			
	b		What are association rules? Provide an example of how they are used in data analysis.	K3	CO2	7M
			How does parametric classification differ from non-parametric approaches?	K1	CO2	7M
3	a		**Unit-III**			
			Describe the Subset Selection method. How does it aid in reducing the number of variables in a dataset?	K1	CO3	7M
			Compare and contrast the Apriori and Eclat algorithms in the context of mining association rules.	K1	CO3	7M
			OR			
	b		Explain Principal Components Analysis (PCA) and its application in uncovering hidden patterns in data.	K3	CO3	7M
			Define Linear Discriminant Analysis and its utility in classification tasks.	K1	CO3	7M
4	a		**Unit-IV**			
			What is the Expectation Maximization algorithm, and how is it utilized in unsupervised learning?	K1	CO4	7M
			Describe the learning process in Self-Organizing Maps(SOM). How does it adjust to new data inputs?	K2	CO4	7M
			OR			
	b		Define k-Means clustering and describe a scenario where it could be effectively applied.	K3	CO4	7M
			Explain fuzzy clustering and provide an example where it might be more appropriate than hard clustering.	K2	CO4	7M

		Unit-V			
5	a	Explain the process of pruning in decision trees. Why is it necessary?	K2	CO5	7M
		What is the basic principle underlying the Random Forest algorithm?	K3	CO5	7M
		OR			
	b	How does a Random Forest improve model accuracy and prevent overfitting?	K4	CO5	7M
		Compare and contrast the performance and use cases of a Decision Tree versus a Random Forest.	K4	CO5	7M

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

NEC ENGINEERING COLLEGE
(AUTONOMOUS)

Subject Code: R20CC1OE01

III B.Tech. - I Semester Supple Examinations, March-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)

QNo			Questions	K L	CO	Marks
			Unit-I			
1	a		Explain human ecology and its application in geographical research.	K2&K3	CO1	7M
			Explain the classification of environmental hazards.	K2&K3	CO1	7M
			OR			
	b		Explain the various disasters affecting the environment.	K2&K3	CO1	7M
			Define disaster and list out the important perceptions of disasters.	K2&K3	CO1	7M
2			**Unit-II**			
	a		Explain the various methods of mitigation of earthquake hazards.	K2&K3	CO2	7M
			Discuss the various types of natural disasters and highlight the specific efforts to mitigate disasters in India.	K2&K3	CO2	7M
			OR			
	b		Explain clearly about landscape approach and perception approach of disaster management.	K2&K3	CO2	14M
3			**Unit-III**			
	a		Explain the factors of capacity building.	K2&K3	CO3	7M
			Differentiate between structural and non-structural measures of flood mitigation and discuss the importance of forecasting, warning, and monitoring systems in India.	K2&K3	CO3	7M
			OR			
	b		Discuss the connection between disaster and development.	K2&K3	CO3	7M
			Explain the importance of capacity building.	K2&K3	CO3	7M
4			**Unit-IV**			
	a		Explain the recognizing signs of disaster.	K2&K3	CO4	7M
			Relate the building collapsed during the earthquake to the impact of earthquake disaster and explain both pre-and post-disaster measures undertaken to mitigate the sufferings of people in an earthquake situation.	K2&K3	CO4	7M
			OR			
	b		Discuss the Recognize Risk Factors in Disaster.	K2&K3	CO4	7M
			Discuss the methods that can be adopted to reduce the effect of volcanic eruption.	K2&K3	CO4	7M
5			**Unit-V**			
	a		Briefly explain the Governmental initiatives for disaster management.	K2&K3	CO5	7M
			Describe the regional and seasonal profile of any two disasters.	K2&K3	CO5	7M
			OR			
	b		Response is the first stage of the Disaster management cycle. Discuss.	K2&K3	CO5	7M
			Discuss in brief the Disaster Management Act 2005.	K2&K3	CO5	7M

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

Subject Code: R20CC1OE10

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
		Unit-I			
1	a	What is the difference between logical data independence and physical data independence? Which one is harder to achieve? Explain why?	1	2	7M
		Explain the two-tier and three-tier client/server architectures?	1	2	7M
		OR			
	b	What are the different types of database end users? Discuss the main activities of each.	1	2	7M
		Discuss the capabilities that should be provided by a DBMS.	1	2	7M
		Unit-II			
2	a	What is an entity type? What is an entity set? Explain the differences among an entity, an entity type, and an entity set.	2	2	7M
		Discuss the conventions for displaying an ER schema as an ER diagram.	2	2	7M
		OR			
	b	What is the difference between specialization and generalization? Why do we not display this difference in schema diagrams?	2	2	7M
		Explain why navigation is simpler in the relational data model than in the hierarchical data model.	2	2	7M
		Unit-III			
3	a	Explain how does SQL allow implementation of the entity integrity and referential integrity constraints? What about referential triggered actions?	3	2	7M
		How can the key and foreign key constraints be enforced by the DBMS? Is the enforcement technique you suggest difficult to implement? Can the constraint checks be executed efficiently when updates are applied to the database?	3	3	7M
		OR			
	b	Explain the different types of joins with suitable examples	3	2	7M
		Given the following relations *CONSISTS_OF (Module, Sub-Module)* *DEVELOPED-BY (Module, Employee)* give SQL queries for the following: (i) List all modules that use the HEAPSORT and BINARY_SEARCH modules. (ii) List employees who were involved in the development of all modules that use the HEAPSORT and BINARY_SEARCH modules. If a module uses another module that uses either the HEAPSORT or BINARY-SEARCH modules, would your query list the employees who were involved? How should you express such a query?	3	3	7M
		Unit-IV			
4	a	What is the dependency preservation property for decomposition? Why is it important? What is the lossless (or nonadditive) join property of a decomposition? Why is it important?	4	2	7M
		Discuss insertion, deletion, and modification anomalies. Why are they considered bad? Illustrate with example.	4	2	7M

			KL	CO	M
		OR			
	b	Explain different types of normal forms with example	4	2	14M
5		**Unit-V**			
	a	Discuss the mechanism used to read data from or write data to the disk.	5	2	7M
		Explain about ACID properties with example	5	2	7M
		OR			
	b	Illustrate about different types of indexing techniques	5	3	14M

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

Subject Code: R20CC1OE16

III B.Tech. - I Semester Supple Examinations, March-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	K L	CO	Marks
1		**Unit-I**			
	a	Discuss functional units of Basic Computer	2	1	7M
		Summarize List of Logic Micro operations and Hardware Implementation	2	1	7M
		OR			
	b	Prepare the Four-bit Arithmetic Circuit and explain its process.	3	1	7M
		Present the Shift micro operations-Hardware Implementation.	3	1	7M
2		**Unit-II**			
	a	Explain Instruction cycle with neat diagram	2	2	7M
		Examine Memory – Reference Instructions	3	2	7M
		OR			
	b	List and explain Input – Output Instructions	1	2	7M
		Display and explain the Computer instructions	3	2	7M
3		**Unit-III**			
	a	Categorize and discuss the Instruction formats	2	3	7M
		Explain the addressing modes.	2	3	7M
		OR			
	b	Discuss the terms Control memory, Address sequencing of the control unit	2	3	7M
		Summarize the Microinstruction Format.	2	3	7M
4		**Unit-IV**			
	a	List the ROM chips and explain.	1	4	7M
		Explain Direct Mapping, Set- Associative Mapping of Cache Memory	4	4	7M
		OR			
	b	Write an algorithm for Booths multiplication and explain with an suitable example.	4	4	14M
5		**Unit-V**			
	a	Explain Peripheral Devices	2	5	7M
		Discuss I/O vs Memory Bus, Isolated vs Memory Mapped I/O	2	5	7M
		OR			
	b	Explain Daisy Chaining Priority Interrupts	4	5	7M
		Explain Direct memory Access	2	5	7M

NARASARAOPETA ENGINEERING COLLEGE
(AUTONOMOUS)

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

Sub Code: R20CC1OE17   MEAN STACK TECHNOLOGIES | 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
		Unit-I			
1	a	i) Differentiate between Property Binding and Event Binding in Angular 8.	KL3	CO1	7M
		ii) What are Angular Directives? Explain the difference between Structural and Attribute Directives.	KL1	CO1	7M
		OR			
	b	i) Describe the purpose of Pipes in Angular. How can you create a custom pipe?	KL2	CO1	7M
		ii) Explain all the Structural Directives with examples.	KL2	CO1	7M
		Unit-II			
2	a	i) List and explain five commonly used Angular CLI commands and their functions.	KL1	CO2	7M
		ii) What are Angular Material Components? Provide an example of using Angular Material in a project.	KL1	CO2	7M
		OR			
	b	i) What is Form Validation in Angular? Explain Template-driven vs. Reactive Forms	KL1	CO2	7M
		ii) How can you implement custom validators in Angular Reactive Forms? Provide an example	KL4	CO2	7M
		Unit-III			
3	a	i) Explain the Node.js event-driven architecture and its advantages.	KL2	CO3	7M
		ii) How does the Node.js Package Manager (NPM) work? What is the difference between npm install and npm install -g		CO3	7M
		OR			
	b	i) Describe the process of creating and using Local Modules in Node.js	KL2	CO3	7M
		ii) Discuss the Node.js process model and its role in handling concurrent requests.	KL3	CO3	7M
		Unit-IV			
4	a	i) What is an Event Emitter in Node.js? Provide an example of how it works.	KL1	CO4	7M
		ii) Explain the difference between synchronous and asynchronous file handling in Node.js. Provide an example.	KL2	CO4	7M
		OR			
	b	i) Create a simple Express.js application that handles a GET request and sends a response.	KL4	CO4	7M
		ii) How does Express.js handle request parameters in routes? Explain with an example using route parameters and query parameters	KL4	CO4	7M
		Unit-V			
5	a	i) What is the difference between insertOne() and insertMany() in MongoDB? Provide an example.	KL2	CO5	7M
		ii) Describe the process of querying a MongoDB database using find() with filtering options.	KL2	CO5	7M
		OR			
	b	i) What are the advantages of using MongoDB over relational databases in MEAN stack development?	KL1	CO5	7M
		ii) How does MongoDB handle indexing? What are its benefits for database performance?	KL4	CO5	7M

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

Sub Code: R20CC1OE19   CLOUD COMPUTING

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 the benefits and limitations of cloud computing for businesses, with examples of its impact on business efficiency.	KL2	CO1	7M
			ii) Explain how cloud computing impacts the traditional business information technology infrastructure.	KL2	CO1	7M
			OR			
	b		i) Summarize the key milestones in cloud computing history and identify any five essential characteristics as defined by NIST.	KL1	CO1	7M
			ii) Analyze the role of major cloud computing vendors. Compare their services in terms of cost, features, and usability for businesses.	KL4	CO1	7M
2			**Unit-II**			
	a		i) Explain the concept of virtualization and describe the different types of virtualization.	KL2	CO2	7M
			ii) Analyze the key design aspects of cloud architecture and how they influence performance and cost.	KL4	CO2	7M
			OR			
	b		i) Describe the role of virtual machines in a virtualized infrastructure. How do virtual machines contribute to better resource utilization?	KL2	CO2	7M
			ii) Analyze the integration of grid and cloud computing in a financial institution's architecture, focusing on security and performance impacts.	KL4	CO2	7M
3			**Unit-III**			
	a		i) Define the three main cloud service models and briefly describe their purposes.	KL1	CO3	7M
			ii) Describe the structure of the cloud stack and how its layers interact.	KL2	CO3	7M
			OR			
	b		i) List and describe the different cloud deployment models.	KL1	CO3	7M
			ii) A company wants to store large amounts of data in the cloud. How would you use cloud storage models to meet their needs efficiently?	KL3	CO3	7M
4			**Unit-IV**			
	a		i) What are cloud management products, and how are they used to administer clouds?	KL1	CO4	7M
			ii) Analyze the key differences between cloud providers and traditional IT service providers, and discuss the pros and cons of using cloud providers.	KL4	CO4	7M
			OR			
	b		i) Explain the processes of cloud service management and how they differ from traditional IT service management.	KL2	CO4	7M
			ii) How would you apply cloud migration strategies to move a business's traditional IT infrastructure to a cloud-based model?	KL3	CO4	7M

5		Unit-V			
		i) Explain the key concepts and domains of Microsoft Azure.	KL2	CO5	7M
	a	ii) Compare Azure and AWS in cloud services and performance. Which is better for a large enterprise, and why?	KL4	CO5	7M
		OR			
	b	i) A company requires a reliable and scalable database solution. How would you implement AWS services to address this need?	KL3	CO5	7M
		ii) Describe important AWS services, focusing on compute and networking, storage, and content delivery.	KL2	CO5	7M

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

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