AR23

CODE: 23MET313 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech.II Semester Regular Examinations, April - 2026
DYNAMIC SYSTEMS AND VIBRATIONS
(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

		Marks	CO	BTL
1.	A cam is to give the following motion to a knife-edged follower: 1. Outstroke during 90° of cam rotation; 2. Dwell for the next 30° of cam rotation; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 180° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower is passing through the axis of the cam shaft.	14M	CO1	L4
	(OR)			
2.	A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below: 1. Follower to move outwards through 50 mm during 120° of cam rotation, 2. Follower to dwell for next 60° of cam rotation, 3. Follower to return to its starting position during next 90° of cam rotation, 4. Follower to dwell for the rest of the cam rotation. The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower takes place with SHM on both the outward and return strokes. Draw profile of the cam.	14M	CO1	L4

UNIT-II

3.		A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance.	14M	CO2	L4

(OR)

4.		An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m. The rotating masses per cylinder are equivalent to 150 kg at the crank pin, and the reciprocating masses per cylinder to 180 kg. The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and 2/3 of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m. Find the magnitude and direction of the balancing masses. Find variation of tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m.	14M	CO2	L3

UNIT-III

5.	a)	A mass of 10kg is suspended from one end of a helical spring, the other end being fixed. The stiffness of the spring is 10N/mm. The viscous damping causes the amplitude to decrease to one-tenth of the initial value in four complete oscillations. If a periodic force of 150Cos50t N applied at the mass in the vertical direction, find the amplitude of the forced vibrations. What is its value at resonance.	8M	CO3	L4
	b)	A vibrating system consists of a mass of 200 kg, a spring of stiffness 80 N/mm and a damper with damping coefficient of 800 N/m/s. Determine the frequency of damped vibrations of the system.	6M	CO3	L3

(OR)

6.	a)	The measurements on a mechanical vibrating system show that it has a mass of 8 kg and spring stiffness of 5.4 N/mm. If the vibrating system has a dashpot attached which exerts a force of 40 N when the mass has a velocity of 1 m/s, find: 1. critical damping coefficient, 2. damping factor, 3. Logarithmic decrement, and 4. ratio of two consecutive amplitudes.	7M	CO3	L1
	b)	A mass of 1 kg is to be supported on a spring having a stiffness of 9800 N/m. The damping coefficient is 5.9 N-sec/m. Determine i. the Natural frequency of the system, ii. the logarithmic decrement and iii. the amplitude after three cycles, if the initial displacement is 0.5cm.	7M	CO3	L3

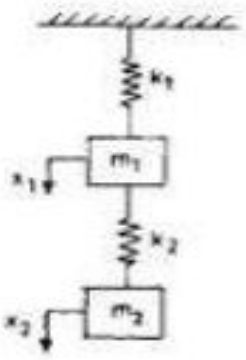
UNIT-IV

7	a)	A shaft of 40mm diameter and 2.5m length has a mass of 15kg per metre length. It is simply supported at the ends and carries three masses of 90 kg, 140 kg and 60 kg at 0.8 m, 1.5m and 2m respectively from the left support. Taking Young's modulus for shaft material as 200 GN/m^2, find the natural frequency of transverse vibrations.	7M	CO4	L4
	b)	A shaft 1.5 m long, supported in flexible bearings at the ends carries two wheels each of 50 kg mass. One wheel is situated at the centre of the shaft and the other at a distance of 375 mm from the centre towards left. The shaft is hollow of external diameter 75 mm and internal diameter 40 mm. The density of the shaft material is 7700 kg/m3 and its modulus of elasticity is 200 GN/m2. Find the whirling speed of the shaft, taking into account the mass of the shaft.	7M	CO4	L3

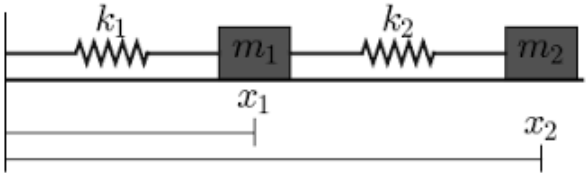
(OR)

8	A steel shaft ABCD 1.5m long has flywheels at its ends A and D. The mass of the flywheel at A is 600kg and has a radius of gyration 0.6m. The mass of the flywheel at D is 800 kg and has a radius of gyration 0.9m. The shaft has a diameter of 50mm for the portion AB which is 0.4m long and has a diameter of 60mm for the portion BC which is 0.5m long; and has a diameter of d mm for the portion CD which is 0.6m long. Determine: 1. The diameter of the portion CD so that the node of the torsional vibrations of the system will be at the centre of the length BC and 2. The natural frequency of the torsional vibrations. Take C= 80GN/m^2.	14M	CO4	L3

UNIT-V

9.	A vibrating system having two degrees of freedom is shown in Fig. Find the two natural frequencies of vibrations and the ratio of the amplitudes of the motion of the masses m_1 and m_2 for the two modes of vibration. Take m_1=1.5 kg, m_2=0.8 kg and k_1=k_2=40N/m. 	14M	CO5	L4

(OR)

10.	Find the mass and stiffness matrix for the figure shown assume no friction. K_1=100 N/m, K_2 =200 N/m. m_1=100kg. m_2 =200kg. 	14M	CO5	L4

AR23

CODE: 23ITT309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April,2026

Principles of Compiler Design

(INFORMATION TECHNOLOGY)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Define lexical analyzer and list its primary functions.	7	CO1	L1
	b)	For the grammar: S → aSb | ab (a) Find leftmost derivation for string aabb (b) Draw the parse tree	7	CO1	L3
		(OR)			
2.	a)	Define regular expressions and finite automata with examples.	7	CO1	L1
	b)	Elimination left factoring on: S → iEtS | iEtSeS | a	7	CO1	L3
		UNIT-II			
3.	a)	Analyse the role of FIRST and FOLLOW sets in eliminating ambiguity during parsing.	7	CO2	L4
	b)	Perform shift-reduce parsing for the string: id + id * id using the grammar: E → E + E | E * E | id Show stack, input, and actions.	7	CO2	L3
		(OR)			
4.	a)	Explain with an example how backtracking occurs in top-down parsing for a given grammar.	7	CO2	L4
	b)	Analyse how ambiguous grammars lead to shift-reduce and reduce-reduce conflicts in parsing.	7	CO2	L4
		UNIT-III			
5.	a)	Analyse how syntax-directed translation simplifies compiler design.	7	CO3	L4
	b)	Generate three-address code for: x = (a + b) * (c + d) Show the steps.	7	CO3	L3
		(OR)			

6.	a)	Analyse the effectiveness of translation schemes in generating intermediate code.	7	CO3	L4
	b)	Evaluate the translation of control flow statements into intermediate code, using an example.	7	CO3	L5

UNIT-IV

7.	a)	Explain how static and dynamic type checking differ in execution and performance.	7	CO4	L2
	b)	Illustrate how activation records are managed during nested procedure calls.	7	CO4	L4

(OR)

8.	a)	Describe the concept of type systems and their role in ensuring program correctness.	7	CO4	L2
	b)	Explain the storage allocation strategies.	7	CO4	L2

UNIT-V

9.	a)	Assess the importance of global data flow analysis in improving performance.	7	CO5	L5
	b)	Explain machine independent optimization	7	CO5	L3

(OR)

10.	a)	Analyse the differences between local and global optimization.Use examples.	7	CO5	L4
	b)	What is the significance of three-address code? translate the given three-address code into assembly instructions: t1 = a + b t2 = t1 * c	7	CO5	L3

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CODE: 23EET313 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April,2026

MICROPROCESSORS AND MICROCONTROLLERS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Discuss in detail about memory organization of 8086 microprocessor.	7	1	2
	b)	Describe the timing diagrams of maximum mode write operation of 8086 with the help of diagram	7	1	2
		(OR)			
2.	a)	Explain about interrupt service routine of 8086	7	1	2
	b)	Explain the following pins of 8086? (i) HOLD (ii) TEST (iii) NMI	7	1	2
		UNIT-II			
3.	a)	Explain Flag manipulation instructions of 8086 microprocessor.	7	2	2
	b)	Discuss different string instructions of 8086 microprocessor	7	2	2
		(OR)			
4.	a)	Write an assembly language program to find the sum of " n" numbers	7	2	2
	b)	Explain the arithmetic instructions of 8086 with examples.	7	2	2
		UNIT-III			
5.	a)	Explain various modes of operation of 8255PPI.	7	3	2
	b)	Explain the operation of Programmable Interrupt Controller 8259A	7	3	2
		(OR)			
6.	a)	Draw and explain the block diagram of USART.	7	3	2
	b)	With a neat sketch explain interfacing of 8255PPI to 8086.	7	3	4
		UNIT-IV			
7.	a)	List the features of 80386 Microprocessor and explain	7	4	2
	b)	Compare 80386 Microprocessor and 80486 Microprocessor	7	4	2
		(OR)			
8.	a)	Illustrate the general structure of a segment descriptor of 80386?	7	4	2
	b)	What is Paging? Explain its implementation in 80386 microprocessors	7	4	2
		UNIT-V			
9.	a)	Explain pin diagram of 8051 microcontroller with the help of diagram	7	5	2
	b)	Explain the PSW register of 8051 microcontroller.	7	5	2
		(OR)			
10.	a)	Explain the interrupt structure of 8051 microcontroller.	7	5	2
	b)	Explain the features of 8051 microcontroller.	7	5	2

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CODE: 23ECT314 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April - 2026

VLSI DESIGN

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Discuss various types of MOSFETs, their symbolic representations and physical structures with neat diagrams.	7	CO1	K2
	b)	Explain the NMOS fabrication steps with neat diagram?	7	CO1	K2
		(OR)			
2.	a)	With neat diagrams, explain the different steps in n-well fabrication of CMOS transistors.	7	CO1	K2
	b)	Compare CMOS and BiCMOS technologies?	7	CO1	K2
		UNIT-II			
3.	a)	Derive an expression for drain current of NMOS transistor in various regions of operation?	7	CO2	K3
	b)	Derive an equation for trans conductance of an n-channel enhancement MOSFET operating in active region.	7	CO2	K2
		(OR)			
4.	a)	Derive an expression for pull up to pull down ratio for an NMOS inverter driven by another NMOS inverter passes through one or more pass transistors?	7	CO2	K5
	b)	Draw schematic diagram of CMOS inverter and explain the operation?	7	CO2	K2
		UNIT-III			
5.	a)	Draw the Stick Diagram for CMOS inverter?	7	CO3	K2
	b)	Explain about the Lambda based design rules for wires and contacts?	7	CO3	K2
		(OR)			
6.	a)	Draw layout diagram for 3-input NOR gate?	7	CO3	K2
	b)	Implement Psudo NMOS inverter and what are the disadvantages?	7	CO3	K2
		UNIT-IV			
7.	a)	Explain the concept of sheet resistance (Rs) and how it is applied to MOS transistors and inverters?	7	CO4	K2
	b)	Explain in detail about inverter delays?	7	CO4	K2
		(OR)			
8.	a)	Draw scaled NMOS transistor and derive all scaling factors for device parameters.	7	CO4	K2
	b)	Derive the expression for propagation delay in CMOS inverter?	7	CO4	K4
		UNIT-V			
9.	a)	Explain the design flow of FPGA?	7	CO5	K2
	b)	Explain the architecture of GAL devices with a block diagram?	7	CO5	K2
		(OR)			
10.	a)	Explain the internal architecture of CPLD with neat diagram?	7	CO5	K2
	b)	Compare CPLD and FPGA interms of architecture, speed, power and applications?	7	CO5	K2

CODE: 23CST313 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April-2026

COMPILER DESIGN

(COMPUTER SCIENCE AND ENGINEERING)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Define a compiler. List and briefly explain all the phases of a compiler with their primary functions.	7	CO1	L1
	b)	Analyse the concept of bootstrapping in compiler design. Explain how a compiler can be written in the same language it compiles	7	CO1	L4
		(OR)			
2.	a)	Explain the role of a lexical analyser. Describe its main functions and define the terms token, lexeme, and pattern.	7	CO1	L2
	b)	Convert the regular expression (a|b)*aab into a transition diagram and explain its working with an example	7	CO1	L3
		UNIT-II			
3.	a)	Describe a parser. What is the role of a parser in a compiler? List the types of parsers used in syntax analysis.	7	CO2	L2
	b)	Perform left factoring on the grammar: S → iEtS | iEtSeS | a	7	CO2	L3
		(OR)			
4.	a)	Evaluate the concept of FIRST and FOLLOW sets. How are they used in predictive parsing?	7	CO2	L5
	b)	Analyse the conditions required for a grammar to be LL(1). Why do left recursion and ambiguity affect LL(1) parsing?	7	CO2	L4
		UNIT-III			
5.	a)	Demonstrate the shift-reduce parsing process for the input string id + id * id using the grammar: E → E + E | E * E | id Show stack, input, and action at each step.	7	CO3	L3
	b)	Analyse the differences between SLR, Canonical LR, and LALR parsers in terms of power, complexity, and parsing table size.	7	CO3	L4
		(OR)			

6.	a)	What is a Syntax-Directed Definition (SDD)? List its components and define synthesized and inherited attributes.	7	CO3	L2
	b)	Given the grammar: $E \rightarrow E + T \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow (E) \mid id$ Construct an S-attributed SDD to evaluate arithmetic expressions.	7	CO3	

UNIT-IV

7.	a)	Explain the differences between synthesized attributes and inherited attributes. How are they evaluated during parsing?	7	CO4	L2
	b)	Generate three-address code, and represent it using: • Quadruples • Triples • Indirect triples for the expression:a = b + c * d	7	CO4	L3

(OR)

8.	a)	Explain the specification of a simple type checker. How does it ensure type correctness in expressions?	7	CO4	L2
	b)	Analyse the differences between access links and control links in activation records. Why are both required?	7	CO4	L4

UNIT-V

9.	a)	Explain graphical representations used in intermediate code generation. How do they help in program analysis and optimization?	7	CO5	L2
	b)	Analyse the principal sources of optimization in a program. How do redundant computations and unreachable code affect performance?	7	CO5	L4

(OR)

10.	a)	Analyse how basic blocks and flow graphs help in optimizing code and improving execution efficiency.	7	CO5	L4
	b)	Deep describe peephole optimization.	7	CO5	L2

AR23

CODE: 23CET313 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April,2026

QUANTITY SURVEYING AND VALUATION

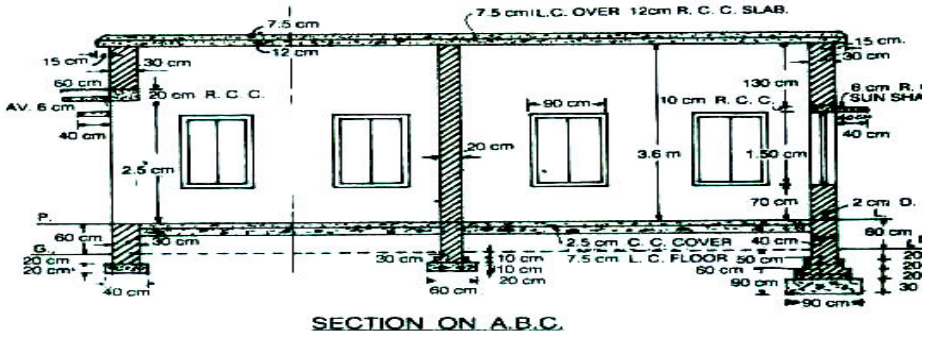
(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 70**

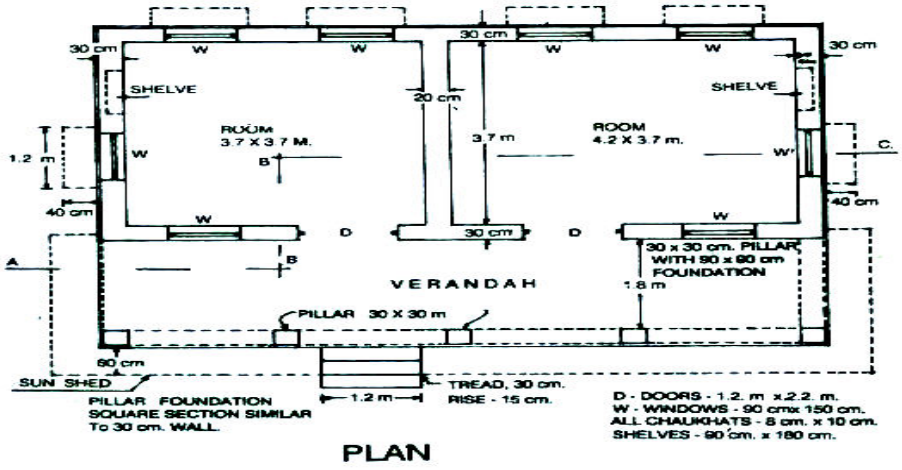
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	Blooms Level
		UNIT-I			
1.	a)	Explain the main items of work in building.	7 M	1	2
	b)	What are the principles of units for various items of works?	7 M	1	2
		(OR)			
2.		Estimate the quantities of the following items of a two roomed building with front verandah from the given drawings. i) Earth work in excavation in foundation ii) lime concrete in foundation iii) 1st class Brick work in foundation and plinth iv) 2.5 cm D.P.C v) 1st class Brick work in super structure	14 M	1	3

TWO ROOMED BUILDING WITH FRONT VERANDAH



SECTION ON A.B.C.



PLAN

		UNIT-II			
3.	a)	Explain the different methods for estimating earthwork in canals.	7 M	2	2
	b)	Estimate the quantity of earthwork for 200 m length for a portion of a road in a uniform ground, the heights of banks at the two ends being 1.00 m and 1.60 m. The formation width is 1.0 m and side slopes 2;1 (H:V). Assume that there is no transverse slope. Use the following methods. i) Mid-Sectional Area method ii) Prismoidal Formula	7 M	2	2

(OR)

4.	Estimate the volume of earthwork for a portion of road from the following data: R.L of formation at 10th chainage is 107 and the road is in downward gradient of 1 in 150 up to the chainage 14 and then the gradient changes to 1 in 100 downward.formation width of the road is 10 m, side slopes are 2:1 in banking, The chainage is 30 m.	14 M	2	3

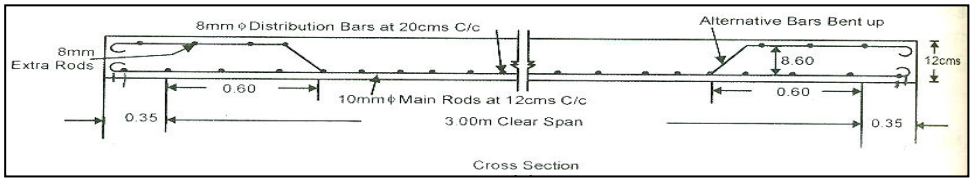
St.	10	11	12	13	14	15	16	17	18
RL of GL	105	105.6	105.44	105.9	105.42	104.3	105	104.1	104.62

UNIT-III

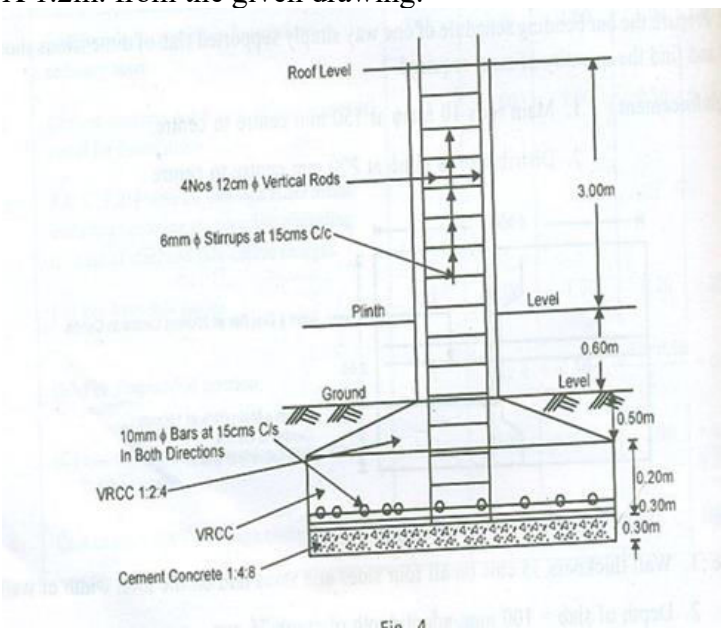
5.	a)	Explain the Detailed Specifications of the R.C.C work and Plastering.	4 M	3	2
	b)	Calculate the cost of the concrete of M25 grade and find the one cu.m. of cost? 1st class mason – 1.5 no's, 2nd class masons – 2 no's, man Mazdoor – 12 no's, women Mazdoor – 18 no's, for curing/watering – 4 no's, water charges – 1½ % of total cost and consider the contractor profit is 13% of total cost.	10M	3	2
6.		Prepare analysis of rate for following item of works. i) Cement Concrete in foundation with mortar proportion 1:2:4 ii) I Class Brick work in super structure with 1:6 cement sand mortar	14 M	3	3

UNIT-IV

7.	Prepare a detailed estimate of a R.C.C roof slab of 3 m clear span and 6 m long from the given drawings. Also prepare schedule of bars.	14 M	4	3



8.	Estimate the quantities for R.C.C square column of size 0.30 X 0.30 m, base 1.2 X 1.2m. from the given drawing.	14 M	4	3



UNIT-V

9.	a)	Discuss the different types of contract in civil engineering.	7 M	5	2
	b)	Discuss the advantages and disadvantages of BIM.	7 M	5	2

(OR)

10	a)	What is valuation? Explain the methods of valuation?	7 M	5	2
	b)	Illustrate the following terms a) Cost b) Price C) Value d) Grass income e) Salvage value f) Scrap value g) Market Value	7 M	5	2

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CODE: 23CAT309 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April,2026

Deep Learning Concepts and Applications

(CSE(AIML))

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Explain the evolution of machine learning techniques from probabilistic models to ensemble methods such as random forests and gradient boosting.	7	CO1	L2
	b)	Assess the strengths and weaknesses of kernel methods compared to neural networks for complex data modeling.	7	CO1	L5
		(OR)			
2.	a)	Analyse the differences between decision trees, random forests, and gradient boosting machines in terms of bias, variance, and model complexity.	7	CO1	L3
	b)	Evaluate how overfitting occurs in decision trees and how ensemble methods like random forests help reduce it.	7	CO1	L5
		UNIT-II			
3.	a)	Outline the key differences between biological neurons and artificial neurons. Illustrate with a diagram.	7	CO2	L1
	b)	Explain various techniques used to improve deep networks such as dropout, batch normalization, and regularization.	7	CO2	L2
		(OR)			
4.	a)	Given a neuron with inputs: • x1=1.5,x2=2.0 • weights: w1=0.6,w2=0.4 • bias = 0.5 Compute output using sigmoid activation	7	CO2	L3
	b)	Analyse the differences between human vision and machine vision in terms of learning, adaptability, and accuracy.	7	CO2	L4

UNIT-III

5.	a)	List and explain the key features of Keras and its supported backends such as TensorFlow, Theano, and CNTK.	7	CO3	L1
	b)	A neural network has: • Input layer: 3 neurons • Hidden layer: 4 neurons • Output layer: 2 neurons Calculate the total number of weights (including biases).	7	CO3	L3

(OR)

6.	a)	Explain the process of setting up a deep learning environment using TensorFlow and Keras.	7	CO3	L2
	b)	Analyse how binary classification differs from multiclass classification in terms of architecture and loss functions.	7	CO3	L4

UNIT-IV

7.	a)	Explain the architecture of CNN implemented in PyTorch.	7	CO4	L2
	b)	A CNN layer has: • Input size = 32×32×3 • Filter size = 5×5 • Number of filters = 6 • Stride = 1, Padding = 0 Calculate output dimensions.	7	CO4	L3

(OR)

8.	a)	Analyse the differences between CNN and traditional neural networks in feature extraction.	7	CO4	L4
	b)	Explain the architecture of RNN with the help of neat diagram.	7	CO4	L3

UNIT-V

9.	a)	Examine the architecture of Generative Adversarial Networks and explain how their components interact during training.	7	CO5	L3
	b)	Illustrate the advantages and limitations of deep learning in natural language processing applications.”	7	CO5	L4

(OR)

10.	a)	Describe the architecture of RBM(RestrictedBoltzmann Machines) and how it differs from DBN.(Deep Belief Networks)	7	CO5	L4
	b)	Evaluate the advantages and limitations of using autoencoders for dimensionality reduction.	7	CO5	L5

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CODE: 23CAT306 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Regular Examinations, April,2026

MACHINE LEARNING

(CSE(DS)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Explain the main challenges of Machine Learning. Discuss the different types of Machine Learning Systems.	7	CO1	K2
	b)	Define Risk Statistics. Explain the concept of Empirical Risk Minimization (ERM) with a simple example.	7	CO1	K1
		(OR)			
2.	a)	Discuss the concept of test loss and the various tradeoffs (e.g., bias-variance tradeoff) in Statistical Learning.	7	CO1	K2
	b)	Illustrate the relationship between Artificial Intelligence, Machine Learning, and Deep Learning with suitable examples.	7	CO1	K3
		UNIT-II			
3.	a)	Explain how the K-Nearest Neighbours (KNN) algorithm classifies a new data point. Illustrate the role of distance metrics in the decision process.	7	CO2	K2
	b)	Consider a dataset with two classes: Class A: (1,2), (2,1); Class B: (5,4), (6,5). Using KNN with k=3 and Euclidean distance, classify a new data point (3,3). Show all steps.	7	CO2	K3
		(OR)			
4.	a)	Describe the working principle of the Naïve Bayes classifier. Why is it called "naïve"? Explain the independence assumption with an example.	7	CO2	K2
	b)	Define regression and discuss briefly about different types of regressions with proper examples.	7	CO2	K3
		UNIT-III			
5.	a)	Explain the concept of unsupervised learning and how it differs from supervised learning. Give two real-world examples.	7	CO3	K2
	b)	Explain the concept of image segmentation and its importance in computer vision. Give two real-world applications.	7	CO3	K3

(OR)

6.	a)	Explain the working principle of the DBSCAN clustering algorithm. Discuss its key parameters (eps and minPts).	7	CO3	K2
	b)	Describe the concept of Gaussian Mixture Models (GMM). How is the clustering approach of GMM fundamentally different from that of K-Means? Illustrate with a scenario where K-Means would fail but GMM would succeed.	7	CO3	K3

UNIT-IV

7.	a)	Explain the Random Forest algorithm with an example. Given a dataset of 10 samples, how does bootstrapping create a training set for a single tree in the forest?	7	CO4	K3
	b)	Discuss the concepts of Bagging and Pasting. What are their key differences and advantages?	7	CO4	K3

(OR)

8.	a)	Differentiate between Linear SVM Classification and Non-Linear SVM Classification techniques. Explain the role of the kernel trick.	7	CO4	K2
	b)	Explain the concept of Ensemble Learning with examples. Compare and contrast Boosting and Stacking.	7	CO4	K3

UNIT-V

9.	a)	What is Principal Component Analysis (PCA)? Explain step-by-step how dimensionality reduction is performed using PCA. For a dataset with features [x, y, z], the covariance matrix is given as: Σ = [[3, 2, 1], [2, 3, 1], [1, 1, 2]]. Calculate the first principal component. *(You may use the fact that the eigenvector corresponding to the largest eigenvalue $\lambda_1 \approx 6.0$ is approximately $[0.58, 0.58, 0.58]^T$)*	7	CO5	K4
	b)	Develop a Scikit-Learn program to perform PCA on a sample dataset, reducing it from 3 dimensions to 2 dimensions.	7	CO5	K3

(OR)

10.	a)	Differentiate between Kernel PCA and Randomized PCA. When would you prefer one over the other?	7	CO5	K2
	b)	Explain the architecture of an Artificial Neural Network (ANN) with a neat diagram. Describe the role of activation functions and list three common ones.	7	CO5	K3

AR20

CODE: 20MET311 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B. Tech II Semester Supplementary Examinations, April-2026

HEAT AND MASS TRANSFER

(MECHANICAL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a	Define thermal conductivity and explain the various factors on which it depends	5M	CO1	L2
	b	A 1mm thick copper plate having thermal conductivity, k=386 W/m K is sandwiched between two 5mm thick epoxy boards having thermal conductivity, k=0.3 W/m^{0}C, 15 x 20 cm^2 in size. If the thermal contact conductance on both sides of the Copper plate is 4000 W/m^{0}C, determine the rate of heat transfer per temperature difference of 100^{0}C across the plate.	5M	CO1	L3
		(OR)			
2.		Derive general differential equation of heat conduction in Cartesian coordinates.	10M	CO1	L3
		UNIT-II			
3.	a	Explain heat transfer from extended surfaces (fins) and their applications	5M	CO2	L2
	b	Derive expression for temperature distribution and heat dissipation for an infinitely long fin.	5M	CO2	L3
		(OR)			
4.	a	A long fin of 10mm diameter made of steel (thermal conductivity, k=43W/m K) is attached to a plate at 200^{0}C and extends to surroundings at 30^{0}C with a convective heat transfer coefficient of 20 W/m^2 K. Find the heat flow rate through the fin.	5M	CO2	L4
	b	Explain lumped system analysis and derive the governing equation.	5M	CO2	L2
		UNIT-III			
5.	a	Explain the need and importance of dimensional analysis in heat transfer.	5M	CO3	L2
	b	Using Buckingham π theorem, derive the dimensionless groups for heat transfer over a flat plate.	5M	CO3	L3
		(OR)			
6.	a	Define and explain Grashof, Prandtl, and Reynolds numbers.	5M	CO3	L2
	b	Explain the concept of thermal boundary layer on a flat plate.	5M	CO3	L2
		UNIT-IV			
7.	a	Discuss heat transfer in turbulent flow over a flat plate.	5M	CO4	L2
	b	Air flows over a flat plate at a velocity of 5 m/s. Determine the local and average heat transfer coefficients for laminar flow.	5M	CO4	L3
		(OR)			
8.	a	Differentiate between film-wise and drop-wise condensation.	5M	CO4	L2
	b	Water at 50^0 C enters a 1.5 cm diameter and 3 m long tube with a velocity of 1 m/s. the tube wall is maintained at a constant temperature of 90^0 C. Calculate the heat transfer coefficient and the total amount of heat transferred if the exit water temperature is 64^0 C.	5M	CO4	L2
		UNIT-V			
9.	a	Classify different types of heat exchangers with neat sketches.	5M	CO5	L2
	b	A counter heat exchanger is to heat air entering at 400^{0}C with a flow rate of 6 kg/s by the exhaust gas entering at 800^{0}C with a flow rate of 4 kg/s. The overall heat transfer coefficient is 100 W/m^{2}K and the outlet temperature of the air is 551.5^{0}C. Specific heat at constant pressure for both air and exhaust gas can be taken as 1100 J/kg K. Calculate: (i) The heat transfer area needed (ii) The number of transfer units.	5M	CO5	L4
		(OR)			
10.	a	Explain the Effectiveness–NTU method with derivation.	5M	CO5	L2
	b	In a parallel flow heat exchanger, hot fluid enters at 150°C and leaves at 100°C, while cold fluid enters at 30°C. Calculate the LMTD.	5M	CO5	L3
		UNIT-VI			
11.	a	State and derive Stefan–Boltzmann law and Wien's displacement law.	5M	CO6	L2
	b	Estimate the diffusion rate of water from the bottom of a test tube 10mm in diameter and 15cm long into dry atmospheric air at 25^{0}C. Take the diffusion coefficient of water through air as 0.225 x 10^4 m 2 /s.	5M	CO6	L3
		(OR)			
12.	a	Derive and explain Fick's law of diffusion and analogy with heat transfer.	5M	CO6	L2
	b	A black body at 1000 K emits radiation. Calculate the total emissive power using Stefan–Boltzmann law.	5M	CO6	L2

AR20

CODE: 20EET312 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, April,2026

MICROPROCESSORS AND MICROCONTROLLERS

(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Draw the architecture of 8086 microprocessor and explain the function of bus interface unit and execution unit.	10	1	K2
		(OR)			
2.	a)	Explain the sign flag, carry flag and auxiliary carry flag of flag register of 8086 microprocessor.	5	1	K2
	b)	Explain the operation of following pins of 8086 microprocessor: (i) DEN' (ii) DT / R' (iii) ALE	5	1	K2
		UNIT-II			
3.	a)	Explain the PUSH, POP and ROL instructions of 8086 microprocessor.	5	2	K2
	b)	Develop an assembly language program for the 8086 microprocessor using directives to implement procedure. Write the comment line for each instruction.	5	2	K3
		(OR)			
4.	a)	Explain the Immediate addressing mode and Direct addressing mode with suitable examples.	5	2	K2
	b)	Develop an assembly language program using directives for the 8086 microprocessor to add two sixteen bit numbers. Write the comment for each instruction.	5	2	K3
		UNIT-III			
5.	a)	Differentiate between asynchronous and synchronous data transfer. Draw and explain the block diagram of 8251 USART.	5	3	K2
	b)	What do you mean by Direct Memory Access? Explain the HOLD and HLDA pins of 8257 DMA controller.	5	3	K2
		(OR)			
6.	a)	Draw and explain the block diagram of 8255 Programmable Peripheral Interface.	5	3	K2
	b)	Explain the architecture of Programmable Interrupt Controller 8259.	5	3	K2
		UNIT-IV			
7.	a)	With a neat sketch explain the real mode operation of 80386 processor.	5	4	K2
	b)	Illustrate the register organization of 80386 processor.	5	4	K2
		(OR)			
8.	a)	Explain the segmentation of 80386.	5	4	K2
	b)	Compare the features of 80486 and Pentium processors.	5	4	K2
		UNIT-V			
9.	a)	Explain the features of RISC architecture.	5	5	K2
	b)	Develop an ALP of ARM processor for performing arithmetic operations.	5	5	K3
		(OR)			
10.	a)	Explain the CPSR register of ARM Processor.	5	5	K2
	b)	Program for block transfer of data from code memory location to another memory location	5	5	K3
		UNIT-VI			
11.	a)	Represent the structure of TMOD register of 8051 microcontroller and explain the significance of its lower four bits.	5	6	K2
	b)	Develop an ALP of 8051 microcontroller to generate square wave at P1.5.	5	6	K3
		(OR)			
12.	a)	Represent the structure of Interrupt Enable (IE) register of 8051 microcontroller and explain the significance of its lower four bits.	5	6	K2
	b)	Develop an ALP of 8051 microcontroller to perform the multiplication and addition on two eight bit numbers.	5	6	K3

AR20

CODE: 20CST312 SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, April, 2026

Compiler Design

(COMPUTER SCIENCE AND ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a)	Write a short notes on Bootstrapping?	5M	1	K2
	b)	Explain the different phases of the Compiler, showing the output of each phase using anexample for the statement z = (a*20) + b – c?	5M	1	K2
		(OR)			
2.	a)	What is Input Buffering? Explain the use of sentinels in recognizing tokens withexample?	5M	1	K2
	b)	Explain how tokens are recognized in compiler design with an example?	5M	1	K2
		UNIT-II			
3.	a)	What are the problems in Top-down Parsing?	3M	2	K1
	b)	Construct Recursive Descent Parser for the following grammar. S → Ab / Ba A→ Ba / BB / ab B → ab / bb / b	7M	2	K4
		(OR)			
4.	a)	Compute FIRST and FOLLOW for the grammar: S->SS+\SS*\a	5M	2	K3
	b)	Define Left recursion? How to remove Left recursion from the given grammar :S →Aa / bA → Ac / Sd / e	5M	2	K2
		UNIT-III			
5.	a)	How can you construct an LR parsing table, and what are the key steps involved in the parsing process?	5M	3	K2
	b)	Consider the grammar E →E + T | E - T | T, T →T * F |T / F | F, F → (E) | idShow the sequence of moves made by shift reduce parser for the input string id1+id2*id3is accepted or not	5M	3	K3
		(OR)			
6.	a)	Write a short notes on YACC?	3M	3	K2
	b)	Show that the following grammar: S→ Aa | bAc | Bc, A→ d, B → d is LR(1) but not LALR(l)	7M	3	K3
		UNIT-IV			
7.	a)	What is syntax directed translation? How it is used for translation of expressions?	5M	4	K1
	b)	Construct an SDD for evaluating arithmetic expressions.	5M	4	K4
		(OR)			
8.	a)	Differentiate between S-attributed and L-attributed definitions.	5M	4	K2
	b)	Explain the details about the specification of a simple type checker	5M	4	K2
		UNIT-V			
9.	a)	Explain the details about the flow graph with example?	5M	5	K2
	b)	What is back patching? How does it help in code optimization?	5M	5	K3
		(OR)			
10.	a)	Write quadruple, triples and indirect triples for the following expression?(x+y)*(y+z)+(x+y+z)	5M	5	K2
	b)	State and implement DAG algorithm with an example.	5M	5	K1
		UNIT-VI			
11.	a)	Write briefly about various Loop optimization techniques?	5M	6	K2
	b)	What is redundant subexpression elimination and How is it different from common subexpression elimination?	5M	6	K3
		(OR)			
12.	a)	Discuss the design issues of Code Generator?	5M	6	K2
	b)	Explain the Code generation algorithm to generate code for the following expression? x=(a-b) + (a+c)	5M	6	K2

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CODE: 20CET312 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, April,2026

IRRIGATION AND WATER RESOURCES ENGINEERING

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

			Marks	CO	BTL
		UNIT-I			
1.	a.	Explain the hydrological cycle in detail with a neat diagram. Discuss the significance of the water-budget equation and its applications in engineering.	5	CO1	Understand
	b.	The annual rainfall data at a station X was found to be missing for the year 2022. The normal annual rainfalls at stations A, B, C and D situated in the neighbourhood of X are 88, 102, 118 and 96 cm respectively. During the year 2022, the annual rainfalls at A, B, C and D were recorded as 72, 88, 102 and 79 cm. Estimate the missing annual rainfall at station X using the Normal Ratio Method.	5	CO1	Apply
		(OR)			
2.	a.	Describe the various types of rain gauges used for measurement of rainfall. Explain with a neat sketch how a tipping bucket rain gauge works.	5	CO1	Understand
	b.	Explain the depth-area-duration (DAD) relationships for a storm and discuss the factors influencing maximum intensity-duration-frequency (IDF) relationships. What is Probable Maximum Precipitation (PMP)?	5	CO1	Understand
		UNIT-II			
3.	a.	Explain the factors affecting the rate of evaporation from a reservoir. Describe the analytical methods used for estimation of evaporation and briefly mention any two methods for its reduction	5	CO2	Understand
	b.	A small watershed has an area of 320 ha. A storm of 4-hour duration produced rainfall at the following rates in successive 30-minute intervals: 4.0, 5.0, 10.0, 12.0, 8.0, 6.0, 3.0 and 2.0 mm/h. If the infiltration capacity at the start of the storm was 8 mm/h and it decreased exponentially to a final value of 2 mm/h with a decay constant k = 0.35 h^{-1}, determine the runoff volume using Horton's equation.	5	CO2	Apply
		(OR)			
4.	a.	What are infiltration indices? Distinguish between the φ-index and the W-index with examples. Explain the factors affecting infiltration.	5	CO2	Understand
	b.	In a 120-minute storm, the following intensities of rainfall were observed in successive 20-min intervals: 10, 14, 22, 16, 8, 6 mm/h. Assuming a φ-index of 6 mm/h and initial losses of 1.2 mm, determine the total rainfall, total runoff, and the W-index for the storm.	5	CO2	Apply
		UNIT-III			
5.		The ordinates of a 4-hour unit hydrograph of a river basin are given below. Derive the direct runoff hydrograph for a storm of two successive periods of 4 hours with rainfall excess of 3 cm and 5 cm respectively.	10	CO3	Apply

Time (h):	0	4	8	12	16	20	24	28
UH (m^3/s):	0	20	60	90	80	50	30	10

(OR)

6.		Explain the procedure for deriving a 3-hour Unit Hydrograph from a 6-hour Unit Hydrograph using the S-curve method. What precautions must be taken?	10	CO3	Apply

UNIT-IV

7.	a.	A 25 cm diameter tube well fully penetrates a confined aquifer of 20 m thickness. The drawdown at the well face is 3.5 m. The permeability of the aquifer is 50 m/day and the radius of influence is 300 m. Calculate the discharge from the well under steady-state conditions.	5	CO4	Apply
	b.	Derive the Thiem's equilibrium equation for steady-state flow in an unconfined aquifer and explain all assumptions clearly.	5	CO4	Understand

(OR)

8.	a.	A 30 cm diameter well penetrates fully into an unconfined aquifer of saturated depth 40 m. During a pumping test, the steady-state drawdown at an observation well 15 m away is 2.0 m and at 60 m away is 0.8 m. Determine the hydraulic conductivity of the aquifer.	5	CO4	Analyse
	b.	Explain the various types of aquifers with neat sketches. Differentiate between specific yield, specific retention, and porosity.	5	CO4	Understand

UNIT-V

9.	a.	A canal has a gross command area of 1,00,000 hectares, of which 80% is culturable irrigable land. The intensity of irrigation for Kharif season is 40% and for Rabi season is 55%. If the duty at the canal head is 700 ha/cumec for Kharif and 1500 ha/cumec for Rabi, determine the design discharge at the canal head.	7	CO5	Apply
	b.	What is water logging? State its causes and ill-effects on agriculture and explain the remedial measures.	3	CO5	Understand

(OR)

10.	a.	Describe the drip/trickle irrigation system with a neat sketch. Mention its advantages, disadvantages, and the crops for which it is most suitable.	7	CO5	Understand
	b.	Explain the concept of consumptive use (evapotranspiration) of a crop. How is the irrigation requirement of a crop estimated?	3	CO5	Understand

UNIT-VI

11.	.	Design an irrigation channel by Lacey's regime theory to carry a discharge of 40 m^3/s. Given: Lacey's silt factor f = 1.0. Compute the velocity, hydraulic mean radius, wetted perimeter, cross-sectional area, bed width, depth and longitudinal slope of the channel.	10	CO6	Apply

(OR)

12.		A trapezoidal channel with bottom width 4.0 m and side slopes 1.5H:1V, Manning's n = 0.018, and a bed slope of 1 in 8000, carries a discharge of 12 m^3/s. Determine the normal depth of flow. Also briefly classify the types of cross drainage works with neat sketches.	10	CO6	Apply

AR18

CODE: 18CET315 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech II Semester Supplementary Examinations, April- 2026

Transportation Engineering-I

(CIVIL ENGINEERING)

Time: 3 Hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.	a)	Write a detailed note on various road network patterns available with neat sketch	7M
	b)	Write a note on Nagpur road plan and its salient features	5M
		(OR)	
2.	a)	Mention various factors affecting road alignment	6M
	b)	Write a note on various engineering surveys performed for proper highway alignment	6M

UNIT-II

3.	a)	Explain in detail various highway cross sectional elements	7M
	b)	Derive an expression for mechanical widening with neat sketch	5M
		(OR)	
4.	a)	Derive an expression for overtaking sight distance	6M
	b)	Define gradient. Mention various gradients used on a highway for proper vertical alignment of a highway	6M

UNIT-III

5.	a)	Explain crushing test performed on aggregate with neat sketch	6M
	b)	Explain impact test performed on aggregate with neat sketch	6M
		(OR)	
6.	a)	Explain test conducted to find out grade of bitumen with neat sketch	6M
	b)	State various requirements of a proper design mix	6M

UNIT-IV

7.	a)	Explain in detail various steps involved in construction of water bound macadam pavements	6M
	b)	Mention requirements and necessity of highway drainage	6M
		(OR)	
8.	a)	Write in detail about necessity and importance of providing arboriculture	6M
	b)	Explain the construction of tie bars in detail	6M

UNIT-V

9.	a)	State various advantages and disadvantages of grade separated intersections	6M
	b)	Write a short note on the following a) Space mean speed b) Time mean speed c) journey speed	6M
		(OR)	
10.	a)	State in detail the importance of 3 E ‘s in accidents prevention and reduction	6M
	b)	Mention various types of at grade intersections along with sketch of various conflict points	6M