

AR16

CODE: 16CE3014

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Regular/Supplementary Examinations, October / November-2019

**TRANSPORTATION ENGINEERING-I
(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

UNIT-I

1. a) Write about 1st 20 year road development plan? 7M
b) How the roads are classified on National network & City road network? 7M
(OR)
2. a) What is highway alignment? Give Types. What is ideal alignment? 7M
b) List various engineering surveys. Explain. 7M

UNIT-II

3. a) Calculate the stopping sight distance on a highway at a descending gradient of 2.5% for a design speed of 80kmph. Assume other data as per IRC recommendations 7M
b) What is the importance of Geometric Design? 7M
(OR)
4. a) Design the rate of superelevation for the horizontal highway curve of radius 600m and speed 100kmph 7M
b) Write about the lengths of various vertical curves 7M

UNIT-III

5. a) What are the aggregate properties and their importance? 7M
b) Write the technical specifications of CBR test? 7M
(OR)
6. a) What is flakiness and elongation Index? How to estimate them. 7M
b) Draw various property variations with bitumen content. 7M

UNIT-IV

7. a) Explain about traffic volume, speed and density. Derive the relation between them. 7M
b) How the data collected for estimation of volume and speed? 7M
(OR)
8. a) What are the causes of accidents on roads? 7M
b) How accidents are prevented to happen? 7M

UNIT-V

9. a) Explain about the conflicts at intersection. 7M
b) Explain various rotary intersections with neat sketches 7M
(OR)
10. a) Discuss about the selection criterion of grade separated intersection. 7M
b) Explain with neat sketch about rotary type grade separated intersection 7M

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SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Regular/Supplementary Examinations, October / November, 2019

**FUNDAMENTALS OF SIGNALS AND SYSTEMS
(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

UNIT-I

1. a) Define and sketch the following elementary signals i). Exponential signal ii) unit Impulse signal iii) Ramp function 7M
b) State with reasons if the following function is periodic. In case of periodic find the period $x(t) = a \sin 4t + b \cos 7t$ 7M

(OR)

2. a) Explain the concept of Time shifting and Time Scaling with relevant examples. 7M
b) Differentiate energy and power signals. Give two examples of each. 7M

UNIT-II

3. a) Explain the properties of convolution 7M
b) Discuss on stability of an LTI system. 7M

(OR)

4. a) Mathematically prove that sampling below nyquist rate creates aliasing effect. 7M
b) Consider the following signals 7M

$$x(t) = \begin{cases} 1 & 0 < t < T \\ 0 & \text{otherwise} \end{cases} \quad h(t) = \begin{cases} t & 0 < t < 2T \\ 0 & \text{otherwise} \end{cases}$$

Perform the time convolution to find $y(t)$

UNIT-III

5. a) Obtain the trigonometric Fourier series for a half wave rectified Sine wave. 7M
b) Find the Fourier transform of : $f(t) = \cos \pi t$ $-\frac{1}{2} \leq t \leq \frac{1}{2}$ 7M

$$f(t) = \begin{cases} \cos \pi t & -\frac{1}{2} \leq t \leq \frac{1}{2} \\ 0 & \text{other wise} \end{cases}$$

(OR)

6. a) Derive the Time shifting and Frequency shifting properties of Continuous Time Fourier Transform 7M
b) Find the Fourier transform of the following and sketch the magnitude and phase spectrum. (i) $x(t) = e^{2t}u(t)$ (ii) $x(t) = \delta(t)$. 7M

UNIT-IV

7. a) State and prove any two properties of Laplace transform. 7M
b) Find the inverse Laplace transform of $X[s] = \frac{1}{(s+5)(s+3)}$ for the following 7M
ROC's
i) $-5 < \text{Re}\{s\} < 3$ ii) $\text{Re}\{s\} > 3$
(OR)
8. a) State and prove Initial value and final value theorems of Laplace transform. 7M
b) Find the Laplace transform of the functions (i) $x(t)=u(t)$ (ii) $x(t)=\sin \omega t u(t)$ and 7M
indicate the ROC.

UNIT-V

9. a) Derive the expression for final value theorem in Z-transform. 7M
b) Find the Z-transform and ROC of the following 7M
(i) $x(n)=a^n \cos \omega_0 n u(n)$ (ii) $x(n)=a^n \sin \omega_0 n u(n)$
(OR)
10. a) Find the Z-transform and ROC of the following 7M
(i) $x(n)=(1,2,-1,3,2,1)$ (ii) $x(n)=(\sin \omega_0 n)u(n)$
(iii) $x(n)=a^n u(n)$
b) State and prove any two properties of Z-transform. 7M

**AUTOMOBILE ENGINEERING
(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

1. a) Differentiate between super charging and turbo charging 7 M
b) What are the different components of an automobile? Explain them briefly. 7 M
- (OR)**
2. a) What are the different emissions from an automobile? Explain the methods to control NO_x. 7 M
b) Explain Dry sump pressure lubrication system with a neat sketch. 7 M

UNIT-II

3. a) Explain Simple carburettor with a neat sketch. 7 M
b) Explain how the spray formation and injection timing influence the combustion in CI engines. 7 M
- (OR)**
4. a) What are the different types of air filters? Explain the air filters that are used for vehicles in a dusty area with a neat sketch. 7 M
b) Explain CRDI system with a neat sketch. 7 M

UNIT-III

5. a) What is the purpose of cooling? List out the effects of improper cooling. 7 M
b) Briefly explain the ignition timing and one method of doing it. 7 M
- (OR)**
6. a) What are the types of cooling systems? Explain thermo siphon cooling with a neat sketch. 7 M
b) Explain magneto ignition system with a neat sketch. 7 M

UNIT-IV

7. a) Explain the construction of differential with help of a neat sketch. 7 M
b) Discuss very briefly about the signs that are there on the dashboard of a passenger car. 7 M
- (OR)**
8. Explain Hotch-kiss drive and torque tube drive with neat sketches. 14 M

UNIT-V

9. What are the different types of steering mechanism? Explain anyone with a neat sketch. 14 M
- (OR)**
10. a) Explain the principle of Hydraulic braking system. Explain wheel cylinder with a neat sketch. 7 M
b) What are the objectives of a suspension system? Explain how the stiffness of spring affects the ride comfort. 7 M

AR16

CODE: 16HS3005

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Regular/Supplementary Examinations, October / November-2019

**MANAGERIAL ECONOMICS AND MANAGEMENT SCIENCE
(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

UNIT-I

1. a) Define Managerial Economics; Explain its Nature and Scope 7M
b) Discuss the various Demand Forecasting Techniques 7M
(OR)
2. a) Describe how important is the role of Managerial Economist in a firm 7M
b) Define Elasticity of Demand. How is it measured 7M

UNIT-II

3. a) How does a least-cost-combination with help of Iso product and Iso cost curves 7M
b) Explain break even analysis in cost analysis 7M
(OR)
4. a) Explain the Internal and External Economies of Scale. 7M
b) Explain the limitations of break even analysis 7M

UNIT-III

5. a) Write the features of Oligopoly markets 7M
b) Explain how price and output are determined in Monopolistic competitive markets 7M
(OR)
6. a) Describe the Perfect Competition Market and its Price Determination 7M
b) Discuss the Pricing Strategies 7M

UNIT-IV

7. a) Explain the importance and Functions of Management 7M
b) Explain the Taylor's Scientific Management Theory 7M
(OR)
8. a) Discuss in detail about Social responsibilities of Management. 7M
b) Explain the Herzberg's Two-Factor Theory of Motivation 7M

UNIT-V

9. a) List out the Functions of Marketing, Marketing 7M
b) Discuss the Channels of distribution. 7M
(OR)
10. a) Distinguish HRM and PMIR 7M
b) Narrate the Role of HR Manager 7M

AR16

CODE: 16CS3014

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Regular/Supplementary Examinations, October / November-2019

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to CSE & IT)

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

1. a) What is meant by time complexity of an algorithm? Discuss the different asymptotic notations. 7 M
- b) Write an iterative algorithm for finding the n^{th} term of Fibonacci sequence. Show how to determine the space and time complexities of the algorithm. 7 M

(OR)

2. a) Write in detail about amortized analysis. 7 M
- b) What is a recursive algorithm? Write a recursive algorithm for computing the power set of a given set. 7 M

Hint: If S is a set of n elements, its power set is the set of all possible subsets of S.

UNIT-II

3. a) Write an algorithm for sorting the given elements using Quick sort. 7 M
- b) Differentiate between divide and conquer method and greedy method. 7 M

(OR)

4. a) State the Job – Sequencing with deadlines problem. Find an optimal sequence to the n=5 Jobs where profits $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ and deadlines $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$. 7 M
- b) Discuss the Dijkstra's single source shortest path algorithm. 7 M

UNIT-III

5. a) Discuss the Dynamic programming solution to construct the optimal binary search tree for the given data. 7 M
- N=4, $(a_1, a_2, a_3, a_4) = (\text{do}, \text{if}, \text{int}, \text{while})$ $P(1, 4) = (3, 3, 1, 1)$ and $q(0, 4) = (2, 3, 1, 1, 1)$
- b) Solve the following 0/1 Knapsack Problem 7 M

i	p_i	w_i
1	1	2
2	2	3
3	5	4
4	6	5

Capacity of the knapsack = 8

(OR)

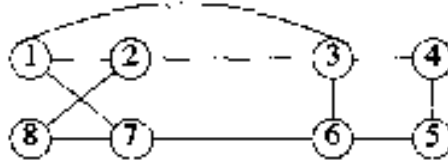
6. a) Find the shortest path between all pairs of nodes in the following graph $AD=1, BC=2, AB=5, BD=3, CD=6, AC=4$ 7 M
- b) State the travelling sales person problem. Consider an instance of it and provide dynamic programming solution to it. Explain the process used to solve it. 7 M

UNIT-IV

7. a) Illustrate DFS and BFS techniques with suitable examples. 6 M
b) Write brief notes on connected components and articulation points in a graph. 8 M

(OR)

8. a) Explain how to solve n-queens problem using backtracking approach. 7 M
b) Define Hamiltonian cycle. Write the algorithm for finding Hamiltonian cycles in a given graph. Consider the following graph and draw the portion of the state space tree generated by the algorithm. 7 M



UNIT-V

9. a) Explain the differences between FIFO and LC Branch and Bound solutions. 6 M
b) Solve the following instance of Travelling Salesman problem using LC branch and bound technique. 8 M

∞	7	3	12	8
3	∞	6	14	9
5	8	∞	6	18
9	3	5	∞	11
18	14	9	8	∞

(OR)

10. a) Describe the general method of Least Cost Branch and Bound technique. 8 M
b) Write short notes on P, NP, NP-Hard and NP-Complete problems. 6 M

AR13

CODE: 13CE3011

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October / November, 2019

TRANSPORTATION ENGINEERING-I (Civil Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Define CRF
b) Write a short notes on IRC
c) Define over taking sight distance
d) List out drawings to be prepared in highway project
e) Define Ruling gradient
f) Define transition curve
g) Define Time mean speed and space mean speed.
h) Define collision diagram
i) Briefly explain the importance of Road Traffic Signs
j) List out various grade separated intersections

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Write in detail about classification of roads as per Nagpur road plan 6M
b) Explain any three factors that control highway alignment in detail 6M
(OR)
3. a) Explain the necessity of various drawing and report formulation in highway alignment 6M
b) Write a detailed note on highway development with particular reference to India 6M

UNIT-II

4. a) Derive an expression for stopping sight distance. 6M
b) Define the term camber. Explain the objectives of providing camber and explain how it is provided on a pavement. 6M

(OR)

5. a) Derive an expression to calculate super elevation on a highway with neat sketch 6M
b) Find the safe over taking sight distance for a high way having a design speed of 100 kmph. Maximum acceleration of overtaking vehicle can be assumed as 1.6 kmph/sec. Assume all other data suitably 6M

UNIT-III

6. a) Explain the various methods of presenting traffic volume data 6M
b) Write a detailed note on various causes of accidents 6M
(OR)
7. a) Write a detailed note on various basic parameters of traffic 6M
b) Write a detailed note on various types of off street parking facilities 6M

UNIT-IV

8. a) Explain Webster Method of signal design 6M
b) Explain in detailed the i) need for road markings ii) Kerb marking 6M
(OR)
9. a) With neat sketches mention various types of traffic signs used by grouping them with relevance 6M
b) Write a short note on the following with a neat sketch 6M
i) Centre line marking ii) road edge strip marking

UNIT-V

10. a) What is a rotary? Explain various advantages and limitations of a rotary 6M
b) Explain various type of At- grade intersections available 6M
(OR)
11. a) Explain a basic movements of a Clover leaf Junction partial and full with neat sketches 6M
b) Write a short note on the following 6M
i) Advantages and disadvantages of an flyover
ii) Various types of traffic islands

AR13

CODE: 13EC3018

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Supplementary Examinations, October / November, 2019

**SIGNALS AND SYSTEMS
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Define signal . Classify signals with examples.
b) Write about LTI System.
c) Define unit step function.
d) Define convolution sum.
e) Define line spectrum.
f) Derive the Fourier transform of signal $u(t)$
g) What is the difference between unilateral and bilateral laplace transform.
h) How the stability of a system is find by using laplace transform.
i) Write the relation between z-transform and DTFT.
j) Define Region of convergence.

PART-B

Answer one question from each unit

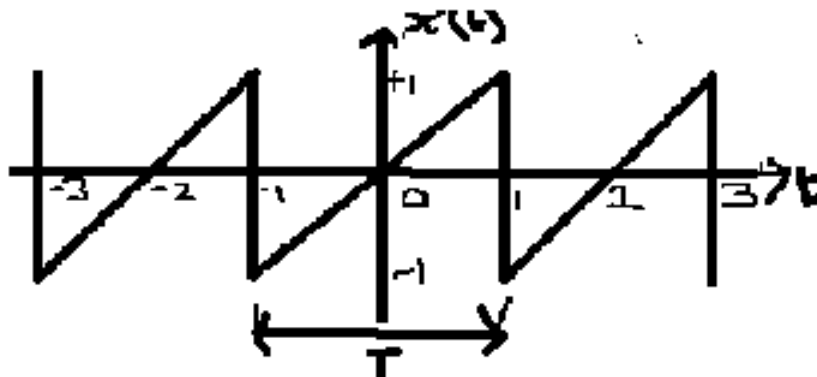
[5x12=60M]

UNIT-I

2. a) Derive the relationship between unit step function and signum function along with their appropriate definitions. **6M**
b) Explain the basic properties of systems **6M**
(OR)
3. a) Explain time domain representation of Discrete time system **6M**
b) Determine whether the following systems are time-invariant or not **6M**
i) $y(t)=t^2x(t)$,ii) $y(t)=x(-2t)$ iii) $y(t)=x(t) \sin(10\pi t)$

UNIT-II

4. Find the trigonometric Fourier series for the periodic signal $x(t)$ shown below. **12M**



(OR)

- 5 For a system excited by $x(t)=e^{-3t}u(t)$, the impulse response is $h(t)=e^{-2t}u(t)+e^{3t}u(-t)$. Determine output. 12M

UNIT-III

6. Derive any 3 properties of Fourier transforms. 12M

(OR)

- 7 Find the Fourier transform of unit step and Signum functions. 12M

UNIT-IV

8. a) Explain ROC and stability. Write properties of Region of convergence. 6M
b) Determine the laplace transform of unit step, impulse and ramp signals. 6M

(OR)

9. a) Explain time shifting and scaling properties of laplace transform. 6M
b) Derive the relationship between laplace transform and fourier transform. 6M

UNIT-V

10. a) Explain long division method of finding Inverse Z-Transform. 3M
b) Find Inverse Z-Transform of $x(z) = \frac{2z^2+1}{4z^2-3z^2+z+1}$, ROC: $|z| > 1$ 9M
using long division method

(OR)

11. a) Explain stability of casual LTISystem using Z-Transform 6M
b) Find unilateral Z-Transform of following signals 6M
i) $x(n)=a^n u(n)$ ii) $x(n)=\sin(n\omega) u(n)$

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CODE: 13EC3015

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

III B.Tech I Semester Supplementary Examinations, October / November, 2019

ANTENNAS AND WAVE PROPAGATION

(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

- 1(a) why is loop antenna called as magnetic dipole?
- (b) Define effective aperture of an antenna.
- (c) What is beam area?
- (d) Define radiation resistance.
- (e) What is uniform linear array?
- (f) What is a binomial array?
- (g) What are the applications of helical antenna?
- (h) What are the different types of horn antennas?
- (i) Define critical frequency.
- (j) Define virtual height.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. Derive the expression for radiation resistance of a half wave dipole. [12M]
- (OR)
- 3(a). Differentiate between effective area and effective length of an antenna. [6M]
 - 3(b) At what distance induction and radiation fields are equal. [6M]

UNIT- II

- 4(a) With the necessary expressions, show that the first side lobe level is -13.5dB for excited array [6M]
 - 4(b) For an end-fire array consisting of several half wavelengths long isotropic radiators is to have a directive gain of 30. Find the array length and width of the major lobe. What will be these values for a broad side array? [6M]
- (OR)
- 5(a) Explain the concept of binomial arrays. [6M]
 - 5(b) Explain End-fire array with increased directivity. [6M]

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SET-2

UNIT III

6. Explain the design and working of rhombic antenna. List its advantages and disadvantages. [12M]

(OR)

- 7(a) Explain the normal mode of operation of a helical antenna. [6M]
7(b) Explain V antenna with its applications [6M]

UNIT IV

- 8(a) Design Yagi Uda antenna of six elements to provide a gain of 12dB if operating frequency is 200MHz. [6M]
8(b) Distinguish between pyramidal and conical horns. Explain their utility, [6M]

(OR)

- 9 Prove that the radiation resistance of a folded dipole antenna is 292Ω . [12M]

UNIT V

- 10 Explain different modes of wave propagation in detail. [12M]
(OR)
11. Derive the expression for critical frequency of ionosphere in terms of maximum electron density. [12M]

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AR13

CODE: 13CS3013

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October / November, 2019

DESIGN AND ANALYSIS OF ALGORITHMS (Computer Science Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1.
 - a) Define Space Complexity.
 - b) Define Big-oh notation.
 - c) Define the divide and conquer method.
 - d) What is greedy method.
 - e) What is Travelling Sales Man Problem?
 - f) What is meant by feasible solution?
 - g) Define state space tree.
 - h) Define chromatic number of the planar graph.
 - i) What is Minimum Cost Spanning tree
 - j) What is knapsack problem

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2.
 - a) Give the algorithm for matrix additions and determine the time complexity of this algorithm by frequency – count method. [8M]
 - b) Give the Big – O notation definition and briefly discuss with suitable example. [4M]
- (OR)
3.
 - a) Explain in detail about connected components and bi-connected components [6M]
 - b) Describe about probabilistic analysis in detail [6M]

UNIT-II

4.
 - a) State the Greedy Knapsack? Find an optimal solution to the Knapsack instance $n=3$, $m=20$, $(P_1, P_2, P_3) = (25, 24, 15)$ and $(W_1, W_2, W_3) = (18, 15, 10)$. [8M]
 - b) Discuss the time complexity of Binary search algorithm for best and worst case [4M]
- (OR)
5.
 - a) What is a Spanning tree? Explain Prim's Minimum cost spanning tree algorithm with suitable example. [8M]
 - b) Write Greedy algorithm for sequencing unit time jobs with deadlines and profits. [4M]

UNIT-III

6. a) Solve the following instance of 0/1 Knapsack problem using Dynamic programming $n = 3$; $(W_1, W_2, W_3) = (3, 5, 7)$; $(P_1, P_2, P_3) = (3, 7, 12)$; $M = 4$. [8M]
b) Explain in detail about Reliability Design with an example [4M]
(OR)
7. a) Write an algorithm of all pairs shortest path problem [6M]
b) Describe the Matrix multiplication chains problem. Apply the recursive solution of dynamic programming to determine optimal sequence of pair wise matrix multiplications. [6M]

UNIT-IV

8. a) Describe Backtracking technique to m-coloring graph. Explain with example [6M]
b) Explain in detail about sum of subsets problem. [6M]
(OR)
9. a) State n-queens problem and Explain 8-queens problem using backtracking [6M]
b) What is a Hamiltonian Cycle? Explain how to find Hamiltonian path and cycle using backtracking algorithm. [6M]

UNIT-V

10. a) State the concept of branch and bound method and also list its applications. [6M]
b) Explain the principles of FIFO Branch and Bound. [6M]
(OR)
11. a) Briefly explain Cooks-theorem. [6M]
b) Solve the Travelling Salesman problem using branch and bound algorithms. [6M]