

**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) Explain about the four most important recommendations made by the Jayakar committee 7M
b) Write a note on the road patterns with neat sketches 7M
- (OR)**
2. a) Write the salient features of Nagpur Road Plan 7M
b) Explain briefly various factors which control the highway alignment. 7M

UNIT-II

3. a) Explain the elements of highway geometric design 7M
b) For a highway with design speed of 100kmph, determine the safe OSD (assume All other data required) 7M
- (OR)**
4. a) Calculate the SSD for $V = 50\text{kmph}$ for (i) two-way traffic on a two lane road 7M
(ii) Two-way traffic on single lane road. Assume reaction time $= 2\text{s}$.
b) Explain curve resistance & compensation in gradient on horizontal curves 7M

UNIT-III

5. a) Explain the requirements of design mix 7M
b) Write down the principles of various tests carried out on bitumen. Explain any two tests in detail with a neat sketch. 7M
- (OR)**
6. a) Write about Aggregate Impact Test. 7M
b) Write about Marshall Mix Design. 7M

UNIT-IV

7. a) Explain basic parameters of traffic 7M
b) What the objectives and application are of spot speed studies? 7M
- (OR)**
8. a) Explain Condition Diagram and Collision Diagrams in accidents 7M
b) Write a detailed note on various types of parking facilities designed for traffic needs 7M

UNIT-V

9. a) Write a detailed note on various types of intersections 7M
b) Draw a neat sketch of a full clover leaf and show the movement of traffic. 7M
- (OR)**
10. a) Explain briefly about grade separated intersections. Discuss the advantages and Limitations. 7M
b) Explain the design considerations of rotary elements. 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) Draw schematic layout of all wheel drive vehicle transmission and explain the function of each component. 8
- b) What are the typical constituents of automobile emissions and how they are harmful to the environment? 6

(OR)

2. a) Draw a sketch of a gear pump for oil and describe its operation. Mention the other types of oil pumps. 9
- b) Explain the term 'unburnt hydro carbons'. Suggest some ways to minimize these. 5

UNIT-II

3. a) What are the different types of Air cleaners? Explain heavy duty and light duty types of air cleaners. 7
- b) Explain the construction and working of fuel injection pump. 7

(OR)

4. a) What are the common troubles with reasons which are likely to occur in a mechanical or electrical fuel pump? 7
- b) What is a turbulent or swirl combustion chamber? How swirl is created in the combustion chamber. 7

UNIT-III

5. a) Sketch and explain the working of a radiator and also explain different types of radiator cores used in modern car engines? 10
- b) Explain the terms 'ignition timing' and 'ignition advance'. 4

(OR)

6. a) Explain the concept of pressurised cooling system. 5
- b) Sketch and explain magneto ignition system. 9

UNIT-IV

7. a) What is the purpose of generator cut-out? How is it eliminated in modern devices? 5
- b) Explain the working of Hotch-kiss drive with a neat sketch. 9

(OR)

8. a) Write a note on the lighting system in an automobile with the help of a line diagram. 6
- b) Explain the working principle of synchromesh gear box with the help of neat sketch. 8

UNIT-V

9. a) Classify and briefly explain the different breaking systems. 6
- b) Explain the terms camber, steering axis inclination, castor, toe-in and toe-out. 8

(OR)

10. a) Explain the difference between the functioning of coil compression springs and shock absorbers. 7
- b) Sketch and explain the working principle of hydraulic braking system. 7

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 Managerial Economics? Explain the scope of Managerial Economics. 7M
- b) What is Price Elasticity of Demand? Explain the types of price elasticity of demand. 7M

(OR)

2. a) Define the Law of Demand. What are its Exceptions? Explain. 7M
- b) What is demand forecasting? Explain the factors governing demand forecasting. 7M

UNIT-II

3. a) Define returns to scale. What is the significance of increasing, decreasing and constant returns to scale? 7M
- b) What are economies of scale? Explain the internal and external economies of scale. 7M

(OR)

4. a) Explain the concepts of Iso Quants and Iso Costs. Analyze how the manufacturer reaches the least cost combination of inputs. 7M
- b) What is break-even point? Explain it through the break-even chart. 7M

UNIT-III

5. a) What are the features of perfect competition? 7M
- b) How do you determine price and output in perfect competition? Illustrate. 7M

(OR)

6. a) Define Pricing? Explain the significance of Pricing. 7M
- b) Explain the various pricing strategies at times of stiff competition. 7M

UNIT-IV

7. a) Define Management? Explain the different functions of Management. 7M
- b) Elucidate the contributions of Henry Fayol to Management theory. 7M

(OR)

8. a) Explain the different approaches of leadership. Which is the best approach? 7M
- b) Briefly explain the Douglas Mc Gregor's Theory X And Theory Y. 7M

UNIT-V

9. a) What is manpower planning? Explain the process of manpower planning. 7M
- b) Define Marketing Management? Explain the different function of marketing. 7M

(OR)

10. a) What is Training and Development? Explain the different methods involved in Training. 7M
- b) What is meant by Recruitment? Explain the various sources of recruitment process. 7M

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

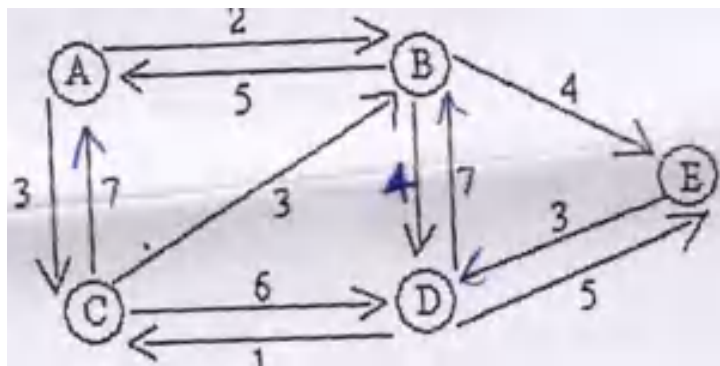
1. a) Explain amortized analysis. 8M
b) Define the following: 6M
i) O -notation ii) Ω -notation iii) Θ -notation
(OR)
2. a) What are little asymptotic notations? What is their significance? 7M
b) Write an algorithm for finding out sum of n natural numbers and also analyze its time complexity. 7M

UNIT-II

3. a) Write an iterative procedure for Binary search and trace it by using following list of elements 8, 14, 25, 42, 57, 72, 83, 89. 7M
b) What is a Spanning Tree? Explain Kruskal's algorithm. 7M
(OR)
4. a) Discuss about Strassen's Matrix Multiplication and derive its time complexity. 7M
b) Explain Single Source Shortest Path Problem using Greedy Approach with an example. 7M

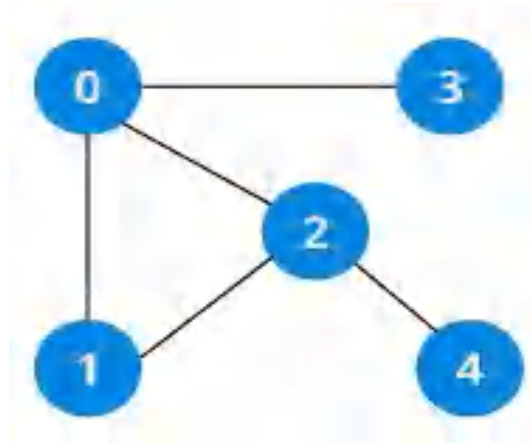
UNIT-III

5. a) Write an algorithm for optimal binary search tree. 7M
b) Given $n=3$ and $M=6$, $(P1, P2, P3)=(1, 2, 5)$, $(W1, W2, W3)=(2, 3, 4)$. Find the optimal solution for 0/1 knapsack. 7M
(OR)
6. Find the shortest path between all pairs of nodes in the following graph by using dynamic programming. 14M



UNIT-IV

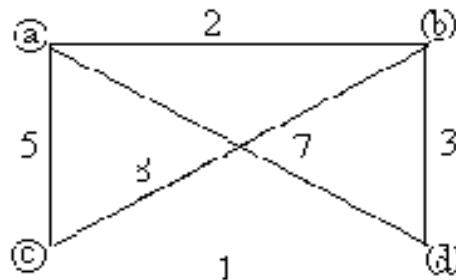
7. a) Write short notes on bi-connected components with an example. 7M
b) Define Backtracking. Draw the state space tree for solution of 4-queens problem. 7M
- (OR)**
8. a) Give the step by step explanation of DFS for the following graph. 7M



- b) Explain Hamiltonian cycle's problem. 7M

UNIT-V

9. Apply the branch and bound algorithm to solve the traveling sales man problem for the following graph. 14M



(OR)

10. a) Differentiate between FIFO Branch and bound and LC Branch and bound. 7M
b) Prove that the 3-SAT Problem is NP-Complete. 7M

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) Explain the concept of Time shifting and time reversal with relevant examples. 7M
- b) Differentiate energy and power signals. Give two examples of each. 7M

(OR)

2. a) Define and sketch the following elementary signals i). Exponential signal ii) unit step signal iii) signum function. 7M
- b) Find the even and odd parts of the following signals. 7M

$$(i) x(t) = \sin 2t + \sin t \cos t + \cos t$$

$$(ii) x(t) = \sin 2t \cos 2t + \cos 3t$$

UNIT-II

3. a) Discuss on stability of an LTI system. 7M
- b) Determine whether the given systems is linear, time invariant or both 7M

$$y(t) = t^2 x(t-1)$$

(OR)

4. a) Derive the expression for sampling theorem. 7M
- b) Find the convolution of $x(t) = e^{-2t} u(t)$ and $y(t) = e^{-4t} u(t)$ 7M

UNIT-III

5. a) State and prove any three properties of continuous time Fourier Transform. 7M
- b) Find the Fourier Transform of the following signals. 7M

$$(i) x(t) = A \sin(2\pi f_c t) u(t) \quad (ii) x(t) = f(t) \cos(2\pi f_c t + \phi) u(t)$$

(OR)

6. a) State and prove time reversal and frequency shifting properties of Fourier transform. 7M
- b) Find the Trigonometric Fourier series for the periodic signal $x(t) = t, 0 \leq t \leq 1$ and repeats every 1 sec. 7M

UNIT-IV

7. a) State and prove initial value and final value theorems of Laplace transform. 7M
- b) Find the inverse Laplace transform of $X[s] = \frac{1}{(s+5)(s+3)}$ for the following ROC's 7M

$$i) -5 < \text{Re}\{s\} < 3$$

$$ii) \text{Re}\{s\} > 3$$

(OR)

8. a) State and prove any two properties 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 indicate the ROC 7M

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

$$(i) x(n) = a^n \cos \omega_0 n u(n) \quad (ii) x(n) = a^n \sin \omega_0 n u(n)$$

(OR)

10. a) State and prove any two properties of Z-transform 7M
- b) Find the Z-transform and ROC of the following 7M

$$(i) x(n) = (\sin \omega_0 n) u(n) \quad (ii) x(n) = a^n u(n)$$

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CODE: 13CE3011 SET-2
ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, January-2020

TRANSPORTATION ENGINEERING-I (Civil Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1.
 - a) What are the various road network patterns?
 - b) What is an expressway?
 - c) Define slip?
 - d) Why is a transition curve required?
 - e) Define jam density?
 - f) What is the name of the instrument/ device used to measure the spot speed?
 - g) What is the time usually allowed for pedestrian crossing when designing signal timings?
 - h) What is a warning sign?
 - i) What is weaving process with reference to rotary intersection?
 - j) What is the difference between an interchange and an intersection?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2.
 - a. Explain the features of an ideal alignment? 4
 - b. Write a note on the classification of roads? 8

(OR)

3. Explain about the Engineering surveys to be carried out for highway alignment/ location? 12

UNIT-II

4.
 - a. Explain off-tracking, with a neat sketch? 4
 - b. A valley curve is formed when a descending gradient on 1 in 45 which meets an ascending gradient of 1 in 35. Design the total length of the valley curve, if the design speed is 90kmph so as to fulfill both comfort condition and head light sight distance for night driving? 8

(OR)

5.
 - a. What is grade compensation and compensated gradient? 4

- b. The radius of a horizontal curve is 400.0m. The total pavement width at curve is 7.60m and the super elevation is 0.07. Design the length of transition curve for a speed of 100.0kmph. Assume the pavement is rotated about the inner edge, and the rate of introduction of super elevation as 1 in 150. Assume any other necessary data. 8

UNIT-III

6. a. Write short notes on PCU and Level of service? 6
 b. A single lane unidirectional highway has a design speed of 65.0kmph. The perception-brake-reaction time of drivers is 2.50seconds and the average length of vehicles is 5.0m. The coefficient of longitudinal friction of the pavement is 0.40. Determine the capacity of this road in terms of vehicles per hour per lane. 6

(OR)

7. a. Explain briefly the various aspects investigated during a parking study? 6
 b. A vehicle skids through a distance equal to 40.0m before colliding with another parked vehicles, the weight of which is 75 per cent of the former. After collision, if both the vehicles skid through 14.0m before stopping. Compute the initial speed of moving vehicle. Assume friction coefficient=0.62. 6

UNIT-IV

8. Explain the IRC method of signal design? 12

(OR)

9. a. Write a note on the classification of traffic signs? 6
 b. A pre-timed four-phase signal has critical lane flow rate for the first three phases as 210, 185 and 210 vehicles/h with saturation flow rate of 1800 vehicles/h/ lane. The lost time is 4 seconds for each phase. If the cycle length is 62 seconds, what is the effective green time (in seconds) of the fourth phase? 6

UNIT-V

10. a. Draw a neat sketch of the various conflict points at a intersection formed when two roads (2-way and 2-lane) meet at right angles. 6
 b. What are types of grade-separated intersections? With a neat sketch, discuss salient features of trumpet interchange. 6

(OR)

11. a. What is Channelization? Discuss the role of different traffic islands. 6
 b. Draw a neat sketch of cloverleaf interchange. Explain its salient features and its applicability? 6

**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
- b) Draw the signal $x(t)=u(t)-u(t+4)$
- c) what is the condition for existence of Fourier series
- d) What is the response of LTI system
- e) What is the Fourier transform of $\delta(t)$
- f) Express $\text{sign}(t)$ in terms of $u(t)$
- g) Define Laplace transform
- h) Laplace transform of $u(t)$
- i) Define ROC for Z transform
- j) What is inverse z transform of $\frac{z}{(z-a)}$

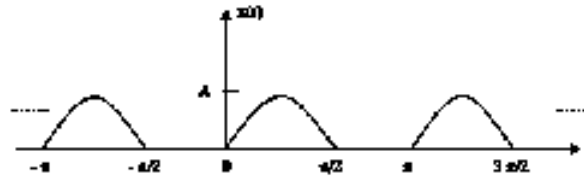
PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Check whether the following signal is energy or power signal 6
 $x[n] = \frac{1}{2^n} u[n]$
- b) Define and sketch the following signals i) $\delta(t+a)$ ii) $u(t-a)$ iii) $\text{sign}(t)$ 6
(OR)
3. a) Determine whether the following signals are energy signals, power signals or neither. 6
i) $x(t) = \cos(at + \phi)$ ii) $x(t) = e^{-at} u(t)$
- b) Find the response of the LTI system for input $x(t) = e^{-at} u(t)$ and impulse response $h(t) = u(t)$. 6

UNIT-II

4. a) Consider the periodic impulse train which is defined 6
as $\delta_T(t) = \sum_{n=-\infty}^{\infty} \delta(t - nT)$ Determine the complex exponential Fourier series.
- b) State and prove Parseval's theorem for Fourier Series. 6
(OR)

5. a) Derive the relation between trigonometric Fourier series and exponential Fourier series. 6
 b) Evaluate the Fourier series expansion of the half wave rectified sine wave shown below. 6



UNIT-III

6. a) State and prove duality property of Fourier transform 6
 b) Find the Fourier transform of $x(t) = \sin(t)$. 6
 (OR)
 7. a) Find the Fourier transform of $x(t) = u(t)$ 6
 b) State and prove time differentiation property of Fourier transform 6

UNIT-IV

8. a) Properties of ROC for Laplace transform 6
 b) State and prove any three properties of Laplace's transform. 6
 (OR)
 9. a) Find out the Laplace transform of $x(t) = \sin(at) u(t)$ 6
 b) Find the Inverse Laplace transform of the following functions such that the time domain signal is right sided. 6

$$X(s) = \frac{s^3 + 1}{s(s+1)(s+2)}$$

UNIT-V

10. a) Find the Z transform and ROC of $x(n) = a^n u(n)$ 6
 b) Find the inverse Z transform of the $X(z) = \frac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}$ 6
 (OR)
 11. a) List out the properties of ROC for Z transform 6
 b) State and prove any two properties of Z transform. 6

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SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, January-2020

CAD/CAM

(Mechanical Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What do you mean by raster scan?
b) What do you mean by uniform scaling operation?
c) List any four basic entities of wire frame modelling.
d) What are the Boolean operations?
e) What information is required to program circular interpolation?
f) Name the types of control systems used in NC.
g) List any four design attributes of a part.
h) Define a part family.
i) What do you mean by product flexibility?
j) List the components of FMS.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

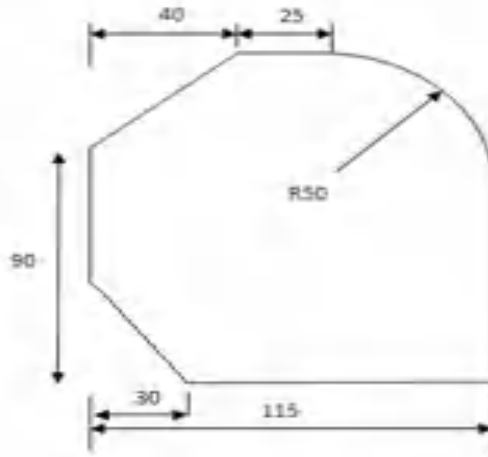
2. (a) Discuss the benefits of CAD.
(b) What are the graphics standards? Why do you require them?
(OR)
3. (a) Write about 3D transformations.
(b) A unit square with vertices A(1,1), B(2,1), C(2,2) and D(1,2) is rotated about the point B by 90° . Obtain the co-ordinates of the transformed square.

UNIT-II

4. (a) Discuss the types of continuities used in geometric modeling.
(b) What is a Bezier curve? How do you change the shape of it? Derive the parametric equation of a cubic Bezier curve.
(OR)
5. (a) With reference to surface modeling explain following.
(i) Surface of revolution (ii) Tabulated cylinder
(b) Write about Boundary representation scheme for creation of solids.

UNIT-III

6. (a) How do you reduce tool changing time and work changing time in a machining center? Explain.
(b) Discuss the advantages of CNC machines
- (OR)
7. The part shown in the figure is to be profile milled. The part is initially band sawed. Thickness of the part is 10mm. write geometry and motion statements according to APT.



UNIT-IV

8. (a) What do you mean by group technology (GT)? What are the benefits of GT?
(b) Apply the rank order clustering technique to the part-machine incidence matrix in the following table. To identify logical part families and machine groups. **Parts are identified by letters and machines are identified numerically.**

	A	B	C	D	E	F
1	1				1	
2				1		1
3	1	1				
4			1	1		
5		1			1	
6			1	1		1

(OR)

9. (a) Discuss OPITZ parts classification and coding system.
(b) Briefly explain various methods of segregating parts into part families.

UNIT-V

10. (a) Explain any one type of CAPP system.
(b) Explain the function of primary and secondary material handling systems.

(OR)

11. (a) What are the functions of computer control in FMS?
(b) What is an automated guided vehicle system (AGVS)? Why it is preferred as a material handling system in any FMS?

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) What are applications of Loop antennas.
- (b) What is the radiation resistance of a short Dipole.
- (c) What is the meaning of Uniform linear array.
- (d) What is the Directivity of an Isotropic source..
- (e) Define the term Pitch angle in helical antenna.
- (f) List the examples of Long Wire antennas.
- (g) Write the function of Parasitic elements in Yagi-Uda antenna.
- (h) What is the advantage of Pyramidal Horn antenna.
- (i) Define the term Inversion layer in Duct propagation.
- (j) Define the term MUF.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

- 2 a). Explain the different types of Polarization methods. [6M]
b). Explain the terms Radiation Efficiency and Beam Efficiency [6M]
(OR)
- 3 Derive the expression for power radiated by a Half wave Dipole. [12M]

UNIT-II

- 4 a). Explain the method of scanning the major lobe using Scanning array. [6M]
b). Derive the expressions for angle corresponding to the Nulls in End fire array. [6M]
(OR)
- 5 a) Explain the parameters that control the shape the pattern in antenna array. [6M]
b). Explain how amplitude excitation coefficients are determined in Binomial array. [6M]

UNIT-III

- 6 a). Explain the significance of Pitch angle in Helix antenna. [6M]
b). Explain the effect of leg length on radiation pattern of V antenna. [6M]

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(OR)

- 7 a). Explain the geometry and radiation pattern of Rhombic antenna. [6M]
b). Explain the construction and working of 'V' antenna. [6M]

UNIT-IV

- 8 a) Explain how aperture blocking is eliminated in Parabolic reflector antenna. [6M]
b). Explain the cassegrain feed mechanism of Parabolic reflector antenna with advantages. [6M]

(OR)

- 9 a) Explain the concept of Fermat's Principle used in Dielectric lens antennas. [6M]
b). Explain the measurement of antenna gain using 3-antenna method. [6M]

UNIT-V

10. a). Assume flat earth; Derive the relationship between critical frequency, maximum Usable frequency, height of Ionospheric layer and skip distance. [6M]
b) Explain the following:
(i) Critical frequency (ii) Skip distance (iii) Maximum usable frequency [6M]

(OR)

- 11 a). Explain the effect of earth curvature on wave propagation. [6M]
b). An HF radio communication is to be setup between two points on the earth surface. The points are at a distance of 2600KM. The height of the Ionospheric layer is 200KM and f_c is 4MHz find MUF. [6M]

PART-A

ANSWER ALL QUESTIONS

[1 X 10 = 10M]

1.
 - a) What is control abstraction?
 - b) What is game tree?
 - c) What are Disjoint Sets?
 - d) Define recursion?
 - e) Define dominance rule.
 - f) What is purging rule?
 - g) What is a spanning tree
 - h) What is greedy method
 - i) What is feasibility function
 - j) Define chromatic number

PART – B

Answer one question from each unit

[5 X 12 = 60M]

UNIT – I

2.
 - (a) What are asymptotic notations explain in detail with suitable examples. [6M]
 - (b) Explain Probabilistic analysis and Amortized analysis with examples each. [6M]

(OR)

- 3.
 - (a) Explain in detail about Amortized and probabilistic analysis [4M]
 - (b) Explain the usefulness of the following functional operations on sets
i) DELETE ii) FIND iii) UNION iv) INSERT [8M]

UNIT- II

4. What is divide and conquer explain algorithm for binary search with example also discuss time complexity. [12M]

(OR)

5.
 - (a) What is a Minimum cost spanning tree explain? [4M]
 - (b) Using Greedy technique find an optimal solution to the Knapsack instance $n=9$, $m=28$, $(p_1, p_2, \dots, p_9) = (10, 12, 15, 10, 9, 11, 10, 18, 13)$ and $(w_1, w_2, \dots, w_9) = (2, 4, 6, 3, 10, 4, 5, 2, 8)$. [8M]

UNIT - III

6.
 - (a) What is back tracking Explain general method? [6M]
 - (b) What is Matrix chain multiplications explain? [6M]

(OR)

- 7.
 - (a) Define the knapsack problem and provide greedy solution for the problem instance [6M]
 - (b) Explain in detail about Reliability design with an example. [6M]

UNIT – IV

8.
 - (a) Briefly explain 8-Queen problem using backtracking explain its application [6M]
 - (b) Briefly explain Hamilton's cycles using backtracking. [6M]

(OR)

9.
 - (a) Explain in detail about sum of subsets problems [6M]
 - (b) Describe back tracking technique to fast Fourier transformer

UNIT- V

10.
 - (a) Explain NP-Hard Graph Problems with examples [6M]
 - (b) Explain COOK'S Theorem in detail. [6M]

(OR)

11. Explain the algorithm for Traveling sales person problem using branch and bound [12M]