

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, Jan / Feb-2016

GEOTECHNICAL ENGINEERING-I  
(CIVIL ENGINEERING)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Mention mineral responsible for swelling in black cotton soils.  
b) Define 'Relative density'/'Density index'.  
c) What is 'Zero air void line'?  
d) IS Classification 'SM' stands for .....  
e) Define 'liquefaction'.  
f) Define effective stress.  
g) Write Coulomb's shear strength equation.  
h) Define compression index.  
i) Draw soil three phase & two phase diagrams of soil  
j) Distinguish between residual soil and transported soil.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Establish the relationship among degree of saturation, soil moisture content, specific gravity of soil particles and void ratio.  
b) From the results of sieve analysis given below plot a graph for percentage finer Vs. grain size and then determine (i) the effective size (ii) The uniformity coefficient (iii) the coefficient of curvature and (iv) classification of soil.

IS Sieve size (mm)	4.75	2.00	1.0	0.425	0.212	0.150	0.075
Mass of soil retained in (gms)	12.0	48.4	92.5	156.5	201.2	106.2	63.2

(OR)

3. a) Define shrinkage limit. Derive the formula for shrinkage limit.  
b) Two clays A and B have the following properties.

	Clay A	Clay B
Liquid Limit, $w_l$ (%)	44	55
Plastic limit, $w_p$ (%)	20	35
Natural water content, $w_n$ (%)	30	50

Which of the clays ,A or B, would experience larger settlement under identical loads ? Which of the soil is more plastic? Which of them is softer in consistency?

**UNIT-II**

4. a) Explain the following factors that affect the permeability of soil :  
(i) Void ratio (ii) Properties of pore fluid.
- b) The result of constant head permeability test in fines sand is as follows: area of the soil specimen =  $90\text{cm}^2$ , Length of the specimen = 320 mm, Constant head maintained = 460 mm, Flow of water through a specimen = 200 ml in 5 min. Determine the coefficient of permeability.  
The fine sand described above was also tested in a falling-head permeameter, and the results are as follows: area of the soil specimen =  $90\text{ cm}^2$ , Length of the specimen = 320 mm, area of the stand pipe =  $5\text{cm}^2$ ; head at the beginning of the test = 1000 mm. Calculate final head after 300 seconds from the start of the test.

**(OR)**

5. a) What are the characteristics of flow net?  
b) Write briefly about the quick sand conditions.

**UNIT-III**

6. a) Explain the assumptions in Westergaard's theory.  
b) An elevated structure with a total weight of 10,000 kN is supported on a tower with 4 legs. The legs rest on piers located at the corners of a square 6 m on a side. What is the vertical stress increment due to this loading at a point 7 m beneath the centre of the structure.

**(OR)**

7. a) Explain how can you determine vertical stress increase due to loading using Newmark's influence chart with neat sketch.  
b) Determine the vertical stress increase at a depth of 1.5 m beneath the centre of square footing of width 3 m and with intensity of loading is  $200\text{ kN/m}^2$

**UNIT-IV**

8. a) Explain how you can determine energy applied in IS light and IS heavy compaction tests.  
b) A soil having specific gravity of grains is 2.85, is subjected to IS light compaction test in mould volume of  $1000\text{ cm}^3$ . The observations are recorded as follows:

Wt. of wet sample (gm)	1650	1725	1735	1790	1775
Water content (%)	19.1	20.5	21.3	22.5	24.0

Plot the water content – dry unit weight curve and obtain MDD & OMC. Draw Zero air voids line also.

**(OR)**

# AR13

CODE: 13CE3013

SET-2

9. a) Define the terms (i) Coefficient of compressibility (ii) Coefficient of volume change and (iii) Compression index
- b) A 8 m thick clay layer with single drainage settles by 120 mm in 2 years. The coefficient of consolidation for this clay was found to be  $6 \times 10^{-3} \text{ cm}^2/\text{sec}$ . Calculate the likely ultimate consolidation settlement and find out how long it will take to undergo 90 percent of this settlement.

## UNIT-V

10. a) Explain shear tests based on drainage conditions.
- b) Direct shear tests on specimens of fine sand gave the following data:

Normal stress( $\text{kN/m}^2$ )	100	175
Shear stress at failure( $\text{kN/m}^2$ )	17.7	19.8

Find the shear strength of soil at a depth of 5 m from G.L., if the void ratio = 0.7,  $G = 2.65$  and GWL is at a depth of 2 m from ground surface.

(OR)

11. a) Explain procedure along with neat sketch to determine shear parameters by conducting Tri-axial Shear test.
- b) The results of a series of CU tests on a clay soil and the following results were obtained.

Cell pressure ( $\text{kN/m}^2$ )	100	300	500
Deviator stress at failure( $\text{kN/m}^2$ )	130	485	645
Pore water pressure at failure( $\text{kN/m}^2$ )	48	140	290

Determine the shear strength parameters in terms of total as well as effective stresses.

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SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, Jan / Feb-2016

LINEAR AND DIGITAL IC APPLICATIONS  
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Time: 3 Hours

Max Marks: 70

## PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

- 1.(a) Describe the concept of virtual ground in Op-amp
- (b) Define Input bias current in Op-amp
- (c) Mention any two application of integrator
- (d) Produce equation for the time period of monostable multivibrator
- (e) Mention the application of sample and hold circuit
- (f) What is the basic difference between comparator and Schmitt trigger
- (g) Produce 2's complement of the binary value 100101
- (h) What is the drawback of weighted resistor DAC over R-2R DAC
- (i) Draw transistor logic diagram of OR gate
- (j) A 1:8 De-Multiplexer consisting of how many selection lines?

## PART-B

Answer one question from each unit

[5 x 12 = 60M]

### UNIT-I

2. a) Discuss about the block diagram of Op-amp and draw the equivalent circuit [6M]
- b) Give the difference between ideal and practical Op-amp. [6M]

(OR)

3. a) Discuss about Op-amp characteristics and parameters [8M]
- b) Elaborate the significance of CMRR in the Op-amp and give methods to improve CMRR. [4M]

### UNIT-II

- 4.a) Derive the expression for gain of an op-amp to be used as Inverting Amplifier and Non-Inverting amplifier with negative feedback [7M]
- b) Why practical integrator is needed over ideal integrator? Justify [5M]

(OR)

- 5.a) Describe the operation of V-I and I-V converters using Op-amp based circuits [6M]  
b) Explain the operation of triangular wave form generator using Op-amp [6M]

### **UNIT-III**

6. a) Design an astable multivibrator using 555 timer for a square wave generator with 50% duty cycle. [6M]  
b) Design a band pass filter for  $f_L=100\text{Hz}$  and  $f_h=1\text{KHz}$ . Also calculate the quality factor [6M]

**(OR)**

7. a) Illustrate the operation of a 565 phase locked loop circuit and mention few applications. [6M]  
b) Design a timer which should turn ON heater immediately after pressing the push button and should hold heater in ON state for 3 seconds? [6M]

### **UNIT-IV**

8. a) Elaborate the functioning of a successive approximation A/D converter [6M]  
b) Explain about TTL driving CMOS and CMOS driving TTL in detail [6M]

**(OR)**

9. a) Detail the specifications of DAC and ADC [6M]  
b) Describe TTL NAND gate analysis and its characteristics [6M]

### **UNIT-V**

10. a) Explain the operation of 3:8 decoder with logic diagram [6M]  
b) Construct one bit digital comparator using gates and explain the operation [6M]

**(OR)**

- 11 a) Design a 4-bit synchronous counter using J-K flip flop [8M]  
b) Discuss about different types of Random Access memories [4M]

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, Jan / Feb-2016

CAD/CAM  
(MECHANICAL ENGINEERING)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. (a) Name any two input devices of CAD systems.
- (b) Write three benefits of CIM.
- (c) Define CAPP. Name the types of CAPP systems.
- (d) Write names for any four programming languages.
- (e) What is Automatic Tool Changer?
- (f) Write about Toll Path Generation.
- (g) What are the special features of machining center?
- (h) Give an example for block in Word Address format.
- (i) Briefly explain Punched Tape.
- (j) Define CAD and CAM.

PART – B

Answer one question from each unit

[5x12 = 60M]

UNIT – I

2. (a) Explain the basic hardware structure of a digital computer with the help of a neat diagram.
- (b) What are the benefits of CAD?

(OR)

3. (a) Explain the following Transformations in 2 D and 3 D concept of Computer graphics with an example.
  - i. Translation.
  - ii. Scaling.
  - iii. Rotation.
- (b) Perform a  $30^{\circ}$  rotation of the triangle A(0,0), B(1,2), C(5,2).
  - i. about origin.
  - ii. About point P(-1,-2).

UNIT – II

4. (a) Explain the functions and requirements of geometric modeling?
- (b) Explain the important features of Bezier Curves.

(OR)

5. (a) How do you represent the following surfaces?
  - i. Plane surface & Ruled surface.
  - ii. Surface of revolution & Tabulated cylinder.
  - iii. Bezier & B- spline surface.
- (b) What are the differences between CSG and B- Rep.

## UNIT – III

6. (a) Define NC. Explain types of NC control Systems with neat diagrams.  
(b) List out the advantages and disadvantages of CNC.

**(OR)**

7. (a) Explain Direct Numerical Control in detail with neat sketch. What are the components of DNC system?  
(b) What is part programming? What are the tasks and concepts of a Computer Assisted Part Programming?

## UNIT – IV

8. (a) Define Group Technology. Define Part family in G T. List out Parts classification and Coding systems. Explain OPITZ system.  
(b) Explain the benefits of Group Technology.

**(OR)**

9. (a) What is Cellular manufacturing? Explain designing of Production cell and Composite Part Concepts with figures and tabular forms.  
(b) Explain the factors considered in selecting a part in Parts classification and coding systems

## UNIT – V

10. (a) Define CIM. Draw a sketch to show the components of CIM systems.  
(b) Draw a diagram to illustrate the scope of CIM and scope of CAD / CAM.

**(OR)**

11. (a) Define FMS. What are the FMS layout configurations? Explain any one of them with neat diagrams.  
(b) What are the benefits of material handling and storage systems?

# AR13

CODE: 13EC3015

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
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III B.Tech I Semester Supplementary Examinations, Jan / Feb-2016

## 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) Define Directivity and Gain of Antenna?
  - b) Define Radiation Intensity and Beam Efficiency of Antennas.
  - c) Define the Reciprocity theorem for antennas?
  - d) Write the relation between the HPBW and BWFN?
  - e) Write short notes on Binomial Arrays.
  - f) Write short notes on Zoning and Tolerances of Lens Antennas.
  - g) What are the advantages of Cassegrain feed?
  - h) Define Critical frequency and MUF.
  - i) Define Virtual Height and Skip distance.
  - j) What is Multihop propagation

### PART-B

Answer one question from each unit

[5x12=60M]

#### UNIT-I

2.
  - (a) Evaluate the field components of Half wave dipole?. [6 M]
  - (b) Use the Reciprocity theorem prove that effective length for transmitting and receiving antenna is same. [6 M]

(OR)

3.
  - (a) Explain the radiation mechanism of a dipole and two wire configurations? [6 M]
  - (b) Explain the current distributions of Quarter wave monopole? [6 M]

#### UNIT-II

4.
    - (a) A 2-element End-fire array in free space consists of 2-vertical side by side  $\lambda/2$  elements with equal out-of-phase currents. At what angles in the horizontal plane is the gain equal to unity? [6 M]  
(i) When the spacing is  $\lambda/2$  (ii) When the spacing is  $\lambda/4$
    - (b) Explain End fire array with increased directivity in detail? [6 M]
- (OR)
5.
    - (a) For a 10-element binomial array with spacing of  $\lambda/2$  between the elements. Determine the half power beam width (in degrees) and maximum directivity (dB) ? [6 M]
    - (b) Find the Directivity of n-element linear array for the case of ordinary end fire array? [6 M]



**UNIT-III**

- 6 Discuss the design relations of Rhombic antenna? Mention the advantages and disadvantages of Rhombic antenna. [12 M]
- (OR)**
- 7 (a) Write a short notes on Uni-directional and Bi-directional V-antenna. [6 M]  
(b) Explain the construction and operation of Helical antenna in detail. [6 M]

**UNIT-IV**

- 8 (a) Design a Yagi-Uda array having six elements to operate at 100 MHz with a folded dipole feed. What are the lengths of reflector, directors and driven elements? What is the spacing between directors, spacing between reflector and driven element? What is the bandwidth and gain? [6 M]  
(b) Explain the geometrical configuration of different reflector systems in detail [6 M]
- (OR)**
- 9 (a) Briefly explain different techniques used for measuring the gain?. [6 M]  
(b) Explain Non metallic dielectric Lens antennas in detail. [6 M]

**UNIT-V**

- 10 (a) Explain the characteristics of ground wave propagation and titling of wave fronts in ground wave propagation. Mention its applications in communication. [6 M]  
(b) What is meant by duct? Explain the different M-curves with the help of graphs [6 M]
- (OR)**
- 11 (a) Explain the structure of ionosphere and characteristics of different ionospheric layers. [6 M]  
(b) Discuss the effect of earth's curvature on tropospheric propagation. [6 M]

# AR13

CODE: 13CS3013

**SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI  
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, Jan / Feb-2016

**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) Which asymptotic notation represents the lower bound on time complexity?
  - b) Define collapsing find rule.
  - c) Which sorting technique behaves in worst case when the given list is sorted?
  - d) What is the relationship between feasible solution and the optimal solution?
  - e) State Bellman's principle of optimality.
  - f) Define answer state in state space tree.
  - g) What is the difference between backtracking and branch and bound?
  - h) Which algorithm is used to solve Sudoku game?
  - i) Give two applications of Travelling sales person problem.
  - j) State Cook's Theorem.

## **PART-B**

**Answer one question from each unit**

**[5x12=60M]**

### **UNIT-I**

2.
  - (a) Develop a functional algorithm to compute the sum of first n Fibonacci numbers. Prove that the algorithm does not require more than  $O(n)$  time and  $O(1)$  space. [7M]
  - (b) Discuss Amortized analysis with an example. [5M]

**(OR)**

3.
  - (a) Develop the algorithm for Union using weighting rule with an example. [6 M]
  - (b) What are Connected and Bi-connected components? Explain with suitable example. [6 M]

### **UNIT-II**

4.
    - (a) Discuss in detail about Divide and Conquer method with example. [6 M]
    - (b) Derive the average case time complexity of Quick sort. [6 M]
- (OR)**
5.
    - (a) Write and explain the Kruskal's algorithm to find minimum cost spanning tree. [6 M]
    - (b) Find the optimal solution to the job sequencing with deadlines for the following  $n=5$ ,  $(P1,P2,P3,P4,P5)=(20,15,10,5,1)$   $(d1,d2,d3,d4,d5)=(2,2,1,3,3)$ . [6 M]

# AR13

CODE: 13CS3013

SET-2

## UNIT-III

- 6 (a) Define merging and purging rules in 0/1 knapsack problem [5M]  
(b) Solve the following 0/1 Knapsack problem using dynamic programming [7M]  
( $p_1, p_2, \dots, p_4$ ) = (1, 2, 5, 6), ( $w_1, w_2, \dots, w_4$ ) = (2, 3, 4, 5),  $m=8$ ,  $n=4$ .

(OR)

- 7 (a) Discuss the dynamic programming solution to the Reliability Design problem. [6 M]  
(b) Find the minimum no of operations required for the following chain matrix multiplication using dynamic programming  $A(5, 3) * B(3, 4) * C(4, 2) * D(2, 6)$  [6 M]

## UNIT-IV

- 8 (a) Draw the state space tree for m coloring when  $n=3$  and  $m=3$ . [6M]  
(b) Describe the 4-queens problem using backtracking. [6M]

(OR)

- 9 (a) Compare and contrast between Brute force approach and Backtracking [6M]  
(b) There are five distinct numbers {1, 2, 3, 4, 5}. Find the combination of these numbers such that the sum is 9. Use Backtracking to arrive at the solution. [6M]

## UNIT-V

- 10 What is travelling sales person problem? Solve the following travelling sales person problem instance using LCBB. [12M]

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(OR)

- 11 (a) Explain the P, NP, NP-Hard and NP-complete classes? Give relationship between them. [7M]  
(b) What are deterministic algorithms? Explain with an example. [5M]