

**GEOTECHNICAL ENGINEERING-II
(Civil Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) When do you apply dilatancy correction in SPT?
b) What is recovery ratio?
c) Define slope circle failure and toe circle failure
d) What is meant by an infinite slope?
e) Distinguish between the active and passive earth pressures
f) What are the classic theories considered for earth pressure analysis?
g) Write the equation minimum depth of foundation.
h) Define raft foundation
i) Difference between drive and cast in-situ pile foundation.
j) At which conditions to you choose group piles

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

2. a) Discuss the various methods for determining the level of the ground water table 6M
b) How would you conduct an in-situ vane shear test? What is it uses? 6M
- (OR)**
3. a) Describe, in brief, various geophysical methods. Discuss their limitations and uses. 6M
b) What do you understand by site investigation? What are the different purposes for which the site investigations are done? 6M

UNIT-II

4. a) List out the various important assumptions involved in Coulomb's and Rankine's earth pressure theories. 6M
b) Discuss different types of failure surfaces that can be considered in slope stability Analyses. 6M
- (OR)**
5. a) Derive the equation for FS of infinite slope in a purely cohesive soil. 6M
Discuss different types of rotational failure surfaces that can be considered in slope stability analyses. 6M

UNIT-III

6. a) Define lateral earth pressure, explain culmann's graphical construction for active pressure and write the steps involved in construction of culmann's graphical method. 6M
b) A retaining wall of 8 m high retains cohesionless soil (backfill) with an angle of internal friction 30° . The backfill surface is level with the top of the wall. The unit weight of the top 3 m of the fill is 19 kN/m^3 and that of the rest is 20 kN/m^3 . Water table is at the surface level of the backfill. Find the magnitude and point of application of the active thrust. 6M

(OR)

7. a) Determine the distribution of active earth pressure and total active force acting on a 6 m high smooth wall with sand as backfill. The sand properties are $\phi = 32^\circ$, $\gamma = 18 \text{ kN/m}^3$; $\gamma_{\text{sat}} = 21 \text{ kN/m}^3$. Water level behind the wall is at 3 m below the Sand surface. 6M
- b) A retaining wall of 4.5 m high with a smooth vertical back. The backfill has a horizontal surface in level with top of the wall and carries a uniformly distributed surcharge load of 20 t/m^2 . The density, angle of internal friction and -cohesive value of soil is 1.9 t/m^3 , 30° and zero respectively. Estimate the magnitude and point of application of the total active pressure per meter length of the wall. 6M

UNIT-IV

8. a) Bring out clearly the effect of ground water table on the safe bearing capacity 4M
- b) Determine the safe bearing capacity of a square footing $2.1 \text{ m} \times 2.1 \text{ m}$ placed at a depth of 1.5 m in a soil with a moist unit weight of 17.5 kN/m^3 , $c = 15 \text{ kPa}$ and $\phi = 20^\circ$. Take $N_c = 11.8$, $N_q = 3.9$ and $N_\gamma = 1.7$. What is the change in safe bearing capacity if the water table rises to 0.5 m above footing base if $F = 3$. 8M
- a). 1.5 m wide strip foundation

(OR)

9. a) Explain the Terzaghi's bearing capacity theory with assumptions 6M
- b) A $3 \text{ m} \times 4 \text{ m}$ rectangular footing is eccentrically loaded. The resultant is 0.2 m outside of centroid widthwise, and 0.3 m outside of centroid lengthwise. If $c = 10 \text{ kPa}$, $\phi = 25^\circ$, $\gamma = 16 \text{ kN/m}^3$, find the safe load carried by footing. What would have been the increase in load carried, if the load was concentric? Take $N_c = 25.1$, $N_q = 12.7$, $N_\gamma = 9.7$. 6M

UNIT-V

10. a) A reinforced concrete pile 9 m long and 0.38 m in diameter is embedded in saturated clay of very stiff consistency. Laboratory tests on samples of undisturbed soil gave an average undrained cohesive strength $c_u = 120 \text{ kN/m}^2$. Determine the allowable axial capacity with $F_s = 3$. $\alpha = 0.9$. 6M
- b) A 40 cm diameter pile is installed by driving through a 7 m thick layer of normally consolidated silt. The cone tip resistance (q_c) varies from 1500 kN/m^2 at surface to 2500 kN/m^2 at 7 m depth. The silt layer overlies a dense sand ($q_c = 2000 \text{ N/m}^2$). If the tip is embedded 2 m into the dense sand, estimate the safe load (F.S. = 3.0). 6M

(OR)

11. a) A group of 16 piles of 50 cm diameter is arranged with a centre to centre spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m^2 . Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. 6M
- b) A soft normally consolidated clay layer is 6m thick with natural water content of 30%. The clay has a saturated unit weight of 17.4 kN/m^3 . A specific gravity of 2.7 and liquid limit of 40%. The ground water level is at surface of clay. Determine the settlement of foundation if the foundation load will subject the center of the clay layer to a vertical stress increase of 8 kN/m^2 . 6M

AR13

CODE: 13EE3018

SET-1

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

III B.Tech II Semester Regular & Supplementary Examinations, April, 2018

**POWER ELECTRONICS
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) A thyristor is triggered by a train of pulse of frequency 4 kHz and of duty cycle 0.2. Calculate the pulse width. In case average gate power dissipation is 1W, find the maximum allowable gate power drive?
- b) Give the expression for average output voltage for a single phase halfwave converter with RL-load.
- c) What are the basic conditions required to commutate(Turn off) an SCR?
- d) Draw the input and output characteristics of MOSFET?
- e) Give the expression for average output voltage for a step up chopper.
- f) Give the expression for rms output voltage for a single phase full bridge inverter?
- g) Draw the circuit diagram of complementary commutation?
- h) List out the various voltage control schemes of an inverter.
- i) The number of pulses in output voltage of a three phase bridge converter is_____.
- j) Name the two types of control strategies for a chopper.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Describe the different modes of operation of a thyristor with the help of its static V-I characteristics. 6M
- b) For an SCR, gate-cathode characteristics are given by $V_g = 1 + 10I_g$. Gate source voltage is a rectangular pulse of 15V with 20μsec duration. For an average gate power dissipation of 0.3W and peak gate drive power of 5W, compute
i)The Resistance to be connected in series with the SCR gate
ii)The trigger frequency. iii)The duty cycle of the triggering pulse.

(OR)

3. a) A number of SCRs each with rating of 2000V and 50A, are to be used in the series-parallel combination in a circuit to handle 11KV and 400A. For a derating factor of 0.15, calculate the number of SCRs in series and parallel units. The maximum difference in their reverse recovery charge is 20 micro coulombs. Calculate
(i) the voltage across each of the slow thyristors in case one series connected SCR is fast. 6M
- b) Enumerate the various mechanisms by which thyristors can be triggered in to conduction. Discuss the techniques which result in random turn- on of a thyristor? 6M

UNIT-II

4. a) Describe the working of a single phase fully controlled midpoint converter with RL load through the wave forms of supply voltage, load voltage, load current and voltage across the thyristor. 7M
- b) A resistive load of 10Ω is connected through a half wave SCR circuit to 220V, 50Hz, single phase source. Calculate the power delivered to the load for a firing angle of 60° . Find also the value of input power factor 5M

(OR)

5. a) Show that the performance of a single phase full converter as effected by source inductance is given by the relation 8M

$$\cos(\alpha + \mu) = \cos(\alpha) - \frac{L_s \cdot I_a \cdot \omega}{V_{m1}}$$

- b) A single phase full-converter is supplied from 230V, 50HZ source. The load resistance is of $R=7\Omega$ and a large inductance to render the load current constant for a firing angle of 45° , then determine (i) average load voltage (ii) average load current. 4M

UNIT-III

6. Describe the working of a three phase half wave converter with R load in continuous conduction mode and draw the output voltage wave forms for $\alpha = 0^\circ$. 12M

(OR)

7. A 3-phase full converter is connected to a resistive load. Show that average output voltage is given by 12M

$$V_o = \frac{3V_{m1}}{\pi} * \cos\alpha \quad \text{for } 0 < \alpha < \frac{\pi}{3}$$

$$V_o = \frac{3V_{m1}}{\pi} * \left(1 + \cos\left(\alpha + \frac{\pi}{3}\right)\right) \quad \text{for } \frac{\pi}{3} < \alpha < \frac{2\pi}{3}$$

Where V_{m1} is the maximum line voltage.

UNIT-IV

8. a) Describe the operation of single phase AC voltage controller for R load with relevant waveforms and derive the expression for output voltage? 8M
- b) A single-phase voltage controller has input voltage of 230V, 50HZ and a load of $R=15\Omega$. For 6 cycles on and 4 cycles off determine
(i) Rms output voltage (ii) Input power factor 4M

(OR)

9. Describe the operation of single phase cyclo converter for RL load with relevant waveforms in continuous and discontinuous mode for a frequency of $f_0 = 1/3f_s$ 12M

UNIT-V

10. a) Draw the circuit diagram of step down chopper and describe its operating principle for R load with relevant waveforms and derive the expression for output voltage? 6M
- b) A step up chopper has input voltage of 200V and output voltage of 400V. If the conduction of switch is $150\mu s$, what is the pulse width of output voltage? If the pulse width of output voltage becomes one fourth for constant frequency operation, calculate the new average value of output voltage 6M

(OR)

11. a) Describe the operation of a basic series inverter with relevant wave forms and give its draw backs 7M
- b) Explain single phase half bridge inverter with R-Load. 5M

AR13

CODE: 13ME3019

SET - 1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech II Semester Regular & Supplementary Examinations, April, 2018

INDUSTRIAL ENGINEERING AND MANAGEMENT
(Mechanical Engineering)

Time: 3 Hours

Max Marks: 70

PART - A

Answer All Questions

[1 x 10 = 10 M]

1. a) Identify various approaches used for designing organizational structures.
b) Distinguish between line and functional organization structures.
c) Mention various facility location models that are available.
d) Explain the advantages of a proper plant layout.
e) List out the procedure for Method Study.
f) Explain how a job is selected for Method Study.
g) What is a purchase order?
h) Mention the functions of stores.
i) Differentiate between variables and attributes.
j) Explain why acceptance sampling is advantageous compared to 100% inspection.

PART - B

Answer one question from each unit

[5x12=60M]

UNIT - I

2. a) Distinguish between line and functional organization structures. 6 M
b) Construct a diagram depicting the formal organization structure of an enterprise or an activity with which you are familiar. 6 M
(OR)
3. a) Categorize various principles of organization. 6 M
b) Identify various approaches used for designing organizational structures. 6 M

UNIT - II

4. a) Explain the factors influencing the selection of plant location. 6 M
b) The governing principle is that "a plant should be so located as to permit the production of the product at the lowest cost per unit." Comment 6 M
(OR)
5. a) Distinguish between product layout and process layout. 6 M
b) Describe the various factors that influence the design of the plant layout. 6 M

UNIT - III

6. a) Discuss various principles of motion economy. 6 M
b) Distinguish between method study and time study. 6 M

(OR)

7. a) A work study was conducted in a workshop and the following data has been recorded: 8 M
Total No. of Observations: 2000, No Activity Observations: 500, Performance Rating = 85%, Total No. of Pieces Produced = 120, Duration of the Study = 60 Hours, Allowances = 15%, Ratio of Manual work to Machine Work = 3:1 portion of the activities. Calculate the standard time using the above give data.
- b) A time study engineer has studied the time taken to machine crank shafts. He has taken 40 observations and these are summarized in the form of frequency distribution given below. The performance rating of the operator machining the crank shaft is 110%. Find the standard time for machining the crank shaft by assuming allowance of 15%. 4 M

Time (in Minutes)	20	21	22	23
Frequency	15	10	10	3

UNIT - IV

8. a) List and explain different types of costs in inventory system. 4 M
b) Explain in detail the types of models of inventory system. 8 M
- (OR)
9. a) Briefly explain the ABC analysis with a suitable example 6 M
b) Give a brief account of stores accounting. 6 M

UNIT - V

10. a) Differentiate between single sampling plan and double sampling plan. 4 M
b) The screws from an automatic screw cutting machine are under inspection. These are inspected in samples of 200 each. Even a single defect in the thread of the screws makes it unacceptable. The observations for 20 days are recorded below. Draw the suitable chart and state your conclusion. 8 M

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of Defectives	2	2	1	2	2	1	2	1	2	3
Sample No.	11	12	13	14	15	16	17	18	19	20
No. of Defectives	2	3	2	2	1	3	3	2	3	1

(OR)

11. a) Explain the concept of reliability with the help of bath tub curve. 4 M
b) Draw an Operating Characteristic curve with Lot size 200, Sample size 90 and with acceptance number is 3 and 5 and comment. 8 M

**DIGITAL SIGNAL PROCESSING
(Electronics & Communication Engineering)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Define causal system.
- b) How to represent the periodic sequence $x(n)$ having period N using Discrete Fourier Series?
- c) List the advantages of FFT over DFT.
- d) Define Z-transform of the sequence $x(n)$.
- e) Distinguish between Chebyshev type-1 and type-2 filters
- f) Write the transformation required to convert analog transfer function into digital using impulse invariant method.
- g) Why FIR filters are always stable?
- h) List any two applications of multi rate DSP.
- i) What are the advantages of VLIW architecture?
- j) Define pipelining.

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

2. a) Describe various elementary discrete time signals. **6M**
 - b) Check the linearity, stability, time-invariant and causality for the system described by $y(n)=nx(n)+x(n+2)+y(n-2)$. **6M**
- (OR)**
3. a) Explain various operations on signals. **6M**
 - b) Determine the linearity, stability, time-invariant and causality for the system described by $y(n)=x(-n-2)$. **6M**

UNIT-II

4. a) Write the steps to implement a butterfly structure In DIT FFT algorithm. **6M**
- b) Compute the DFT for the sequence $\{1, 2, 0, 0, 0, 2, 1, 1\}$ using radix - 2 DIT FFT algorithm. **6M**

(OR)

5. a) Explain the use of FFT algorithms in linear filtering and correlation. **6M**
b) Find the DFT of the sequence $x[n]=\{1,2,3,4,5,6,7,8\}$. **6M**

UNIT-III

6. a) Derive the expression for Bilinear Transformation. **6M**
b) Determine $H(Z)$ for a Butterworth filter satisfying the following specifications: **6M**

$$\begin{aligned} 0.9 \leq |H(e^{jw})| \leq 1 & \quad 0 \leq w \leq \frac{\pi}{2} \\ |H(e^{jw})| \leq 2 & \quad \frac{3\pi}{4} \leq w \leq \pi \end{aligned}$$

Assume $T=0.1$ sec. Apply bilinear transformation method

(OR)

7. Obtain the direct form I, direct form II and Cascade form realization of the following system functions. **12M**
 $y(n) = 0.1 y(n-1) + 0.2 y(n-2) + 3x(n) + 3.6 x(n-1) + 0.6 x(n-2)$.

UNIT-IV

8. a) Design a Linear phase low pass FIR filter with a cut off frequency of $\pi/2$ rad/sec using frequency sampling technique. Take $N=13$. **6M**
b) Find and explain the frequency responses of rectangular and Hanning windows. **6M**

(OR)

9. a) Compare FIR and IIR filters. **6M**
b) With necessary derivation explain the operation of sampling rate conversion by a non integer. **6M**

UNIT-V

10. a) Explain the architecture of TMS320C5X Processor with neat diagram. **6M**
b) State the advantages of DSP processors over conventional microprocessors. **6M**

(OR)

11. Write short notes on the following: **12M**
a) Multiplier and Accumulator
b) Special addressing modes of DSP processors.

AR13

CODE: 13CS3017

SET-1

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

III B.Tech II Semester Regular & Supplementary Examinations, April, 2018

NETWORK SECURITY AND CRYPTOGRAPHY

(Computer Science & Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Differentiate between Active attacks and Passive Attacks
b) Compare Block and Stream cipher
c) Differentiate between sub bytes and sub words.
d) Name the principle elements of a public key crypto system?
e) What are the security services provided by digital signature?
f) What are the services provided by PGP?
g) What are the elements of MIME?
h) Why does ESP include a padding field?
i) List 4 requirements were defined by Kerberos.
j) What are the advantages of intrusion detection system over firewall?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Show the relationship between security mechanisms and services in terms of matrix. 6M
b) Apply Vigenere Cipher to generate cipher text using the key word “deceptive” for the following plain text “THIS IS SAMPLE TEXT”. 6M

(OR)

3. a) Differentiate between transposition cipher and substitution cipher. Apply two stage transpositions Cipher on the “treat diagrams as single units” using the keyword “sequence”. 6M
b) Encrypt the word “MEET ME AFTER THE TOGA PARTY” with the keyword “BALLOON” using play fair cipher 6M

UNIT-II

4. a) Users A and B use the Diffie- Hellman key exchange technique, a common prime $q=11$ and a primitive root $\alpha=7$. 6M
(i) If user A has private key $X_A=3$. What is A’s public key Y_A ?
(ii) If user B has private key $X_B=6$. What is B’s public key Y_B ?
(iii) What is the shared secret key? Also write the algorithm.

- b) Show that Signature Verification process in any digital Signature algorithm is mathematically related to Signature Generation process. Justify with an example. 6M

(OR)

5. a) Demonstrate the encryption and decryption for the RSA algorithm parameters. $P=3$, $Q=11$, $E=7$, $d=?$ $M=5$. 6M
b) Illustrate HMAC structure with a neat diagram 6M

UNIT-III

6. a) Discuss Kerberos and name its Servers and briefly explain duties of each server. 6M
b) Draw X.509 Certificate Revocation List. 6M

(OR)

7. a) How does PGP provide authentication and confidentiality for email services and for file transfer applications? Draw the block diagram and explain the components. 6M
b) Write a short note on S/MIME. 6M

UNIT-IV

8. a) Compare Transport and tunnel modes in IP security. 6M
b) Write a short note on IPSec Protocol. 6M

(OR)

9. a) A receives an authenticated packet with the sequence number 331. The replay window spans from 200 to 263. What will the host do with the packet? 6M
b) Discuss about selectors in a Security Policy Database (SPD) entry. 6M

UNIT-V

10. a) List and Brief, the different generation of antivirus software 6M
b) Describe the familiar types of firewall configurations. 6M

(OR)

11. a) Define intrusion detection and the different types of detection mechanisms, in detail 6M
b) What are the positive and negative effects of firewall? 6M

AR13

CODE: 13IT3002

SET-I

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech II Semester Regular & Supplementary Examinations, April, 2018

COMPUTER NETWORKS (Information Technology)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What do you mean by Protocol?
- b) What are the two types of Transmission technologies, basis on which computer networks can be categorized?
- c) Define framing and its necessity.
- d) Differentiate between bridge and router.
- e) What is routing?
- f) What is CSMA/CD?
- g) How is IPv4 header checksum calculated?
- h) Define proxy.
- i) What is dynamic web document?
- j) What is the function MIME in E-Mail?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) What are Key benefits of layering? 6
- b) Differentiate between TCP and OSI Models 6
- (OR)
3. a) Explain about key components of Data Communication 6
- b) Explain about different categories of Networks 6

UNIT-II

4. a) Briefly describe the following flow control mechanism Stop and Wait 6
- b) Briefly describe the following flow control mechanism Go Back-N 6
- (OR)
5. a) Explain the frame format of HDLC protocol 6
- b) Differentiate between Transparent bridges and Source Routing bridges 6

AR13

CODE: 13IT3002

SET-I

UNIT-III

6. a) Discuss implementation of connectionless services in Network layer 6
b) Compare and contrast Virtual circuit and datagram subnets 6
(OR)
7. a) Explain IPv4 class full addressing scheme in detail 6
b) Explain the three flags in the IPv4 Header 6

UNIT-IV

8. a) Describe the credit scheme used by TCP flow control 6
b) Explain the use of Multiplexing in the context of Transport protocol 6
(OR)
9. a) Explain Crash recovery mechanism in Transport layer 6
b) Describe various elements of Transport Protocols 6

UNIT-V

10. a) Write a short notes on DNS. 6
b) Write a short notes on SNMP. 6
(OR)
11. a) Discuss about SMTP protocol. 6
b) Write a short notes on http protocol. 6