

AR16

CODE: 16CE3011

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

GEOTECHNICAL 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) There are two borrow areas A and B which have soils with void ratios of 0.80 and 10M
0.70, respectively. The in-place water content is 20%, and 15%, respectively. The
fill at the end of construction will have a total volume of $10,000 \text{ m}^3$, bulk density of
 2 Mg/m^3 and a placement water content of 22%. Determine the volume of the soil
required to be excavated for both areas. $G = 2.65$.
If the cost of excavation of soil and transportation is Rs. 200/- per 100 m^3 for area
A and Rs. 220/- per 100 m^3 for area B, which of the borrow area is more
economical?
b) Define soil structure and list different types of soil structures. 4M
- (OR)
2. a) Discuss the characteristics and the construction of Kaolinite, Illite and 7M
Montmorillonite minerals.
b) A sample of saturated soil has a water content of 25% and unit weight of 20 kN/m^3 . 7M
Determine dry density, void ratio and specific gravity of solid particles. What
would be the bulk unit weight of the soil at the same void ratio but at a degree of
saturation of 80%. Take $\gamma_w = 10 \text{ kN/m}^3$.

UNIT-II

3. a) Derive the expression for critical hydraulic gradient. 7M
b) The falling-head permeability test was conducted on a soil sample of 4 cm 7M
diameter and 18 cm length. The head fell from 1.0 m to 0.40 m in 20 minutes. If
the cross-section area of the stand pipe was 1 cm^2 , determine the coefficient of
permeability.
- (OR)
4. a) Explain the uses of flow net 7M
b) What are the different methods for determination of coefficient of permeability in 7M
laboratory? Discuss their limitations.

UNIT-III

5. a) A soil profile consists of a surface layer of clay 4 m thick ($\gamma = 19.5 \text{ kN/m}^3$) and a 7M
sand layer 2 m thick ($\gamma = 18.5 \text{ kN/m}^3$) overlying an impermeable rock. The water
table is at the ground surface. If the water level in a standpipe driven into the sand
layer rises 2 m above the ground surface, draw the plot showing the variation of
total, neutral and effective stresses. Take $\gamma_w = 10 \text{ kN/m}^3$.
b) Calculate the vertical stress at a point P at a depth of 2.5 m directly under the 7M
centre of the circular area of radius 2m and subjected to a load 100 kN/m^2 . Also
calculate the vertical stress at a point Q which is at the same depth of 2.5 m but
2.5m away from the centre of the loaded area.

(OR)

6. a) A sand deposit is 10m thick and overlies a bed of soft clay. The ground water table is 3m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variation of the total stress, pore Water pressure and the effective stress. The void ratio of the sand is 0.70. take $G=2.65$. 6M
- b) An L – shaped building in plan (Fig.1) exerts a pressure of 75 kN/m^2 on the soil. 8M
Determine the vertical stress increases at a depth 5 m below the interior corner P.

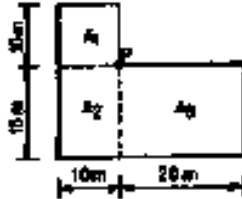


Fig.1

UNIT-IV

7. a) The following results were obtained from a standard compaction test on a sample of soil. 10M

Water content (%)	0.12	0.14	0.16	0.18	0.20	0.22
Mass of the wet soil (kg)	1.68	1.85	1.91	1.87	1.87	1.85

The volume of the mould used was 950 ml. make necessary calculation and plot the compaction curve and obtain the maximum dry density and the optimum water content. Also calculate the void ratio, the degree of saturation and the theoretical maximum dry density ($G = 2.70$).

- b) Differentiate between consolidation and compaction. 4M

(OR)

8. a) Describe briefly the procedure to compute the pre-consolidation pressure. 7M
- b) Explain the consolidation process with spring analogy mechanism. 7M

UNIT-V

9. a) A series of consolidated-undrained triaxial tests was conducted on an over-consolidated clay and the following results were obtained. 10M

Sample No.	Cell pressure (kN/m^2)	Deviator stress (kN/m^2)	Pore-water pressure (kN/m^2)
1	125	510	-70
2	250	620	-10
3	500	850	+120

Plot the strength envelopes in term of total stresses and effective stresses, and hence determine the strength parameters.

- b) What are the three standard tri axial shear tests with respect to drainage conditions? 4M

(OR)

10. a) Describe the triaxial shear test. What are the advantages of triaxial shear test 8M
- b) A series of direct shear test was conducted on a soil, each test was carried out till the sample failed. The following results were obtained 6M

Sample No.	Normal stress(kN/m^2)	Shear stress(kN/m^2)
1	15	18
2	30	25
3	45	32

Determine the cohesion intercept and the angle of shearing resistance.

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SET-2

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

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

POWER SYSTEMS-III

(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) Calculate the RRRV of a 220kV circuit breaker with earthed neutral. The short circuit test data obtained is as follows: 7M

The current breaker is symmetrical and the restriking voltage has an oscillatory frequency of 15 kHz. The power factor of the fault is 0.2. Assume the short circuit to be an earthed fault.

- b) Explain in detail about the current zero method of arc interruption of a circuit breaker? 7M

(OR)

2. a) In a system of 132kV, the line to ground capacitance is $0.01\mu\text{F}$ and the inductance is 5H. Determine the voltage appearing across the pole of a Circuit Breaker. If a magnetizing current of 5amps (instantaneous value) is interrupted. Determine also the value of resistance to be used across the contacts to eliminate the re striking voltage 7M

- b) In a system the r.m.s voltage is 19.1kV, L is 10mH, C is $0.02\mu\text{F}$. Determine the average rate of rise of restriking voltage, when the circuit breaker opens. 7M

UNIT-II

3. a) Compare the characteristic of i) impedance relay ii) mho relay iii) reactance relay. Also give their applications 7M

- b) Draw a neat sketch of an induction disc relay and discuss its operating principle 7M

(OR)

4. Show the MHO relay characteristic on the R-X diagram. Discuss the range setting of various distance relays placed at a particular location. 14M

UNIT-III

5. a) A 10MVA, 6.6KV 3phase star connected alternator is protected by Merz-Price circulating current system. If the ratio of the current transformer is 1000/5, the minimum operating current for the relay is 0.75A and the neutral point earthing resistance is 6ohms, calculate: 7M

i) the percentage of each of the stator windings which is unprotected against earth faults when the machine is operating at normal voltage.

ii) the minimum resistance to provide protection for 90% of the stator winding

- b) Explain Protection of generators against Stator faults. 7M

(OR)

6. a) Discuss about the Merz-price protection for alternator stator windings faults with suitable diagrams. 7M
- b) A star-connected, 3-phase, 10 MVA, 6.6 kV alternator is protected by circulating current protection, the star point being earthed via a resistance r . Estimate the value of earthing resistor if 85% of the stator winding is protected against earth faults. Assume an earth fault setting of 20%. Neglect the impedance of the alternator winding. 7M

UNIT-IV

7. a) Explain about the distance protection of Transmission lines 7M
- b) Represent the Differential Pilot-Wire Protection of lines using Translay scheme and explain. 7M

(OR)

8. Explain the construction and principle of operation of a Translay relay applied to a single phase and three phase system 14M

UNIT-V

9. a) Discuss about ungrounded system 7M
- b) Describe the construction and principle of operation of valve type lightning arrester 7M

(OR)

10. Discuss the phenomenon of lightning stroke with neat diagrams. 14M

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SET-1

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

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

DESIGN OF MACHINE MEMBERS – I (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

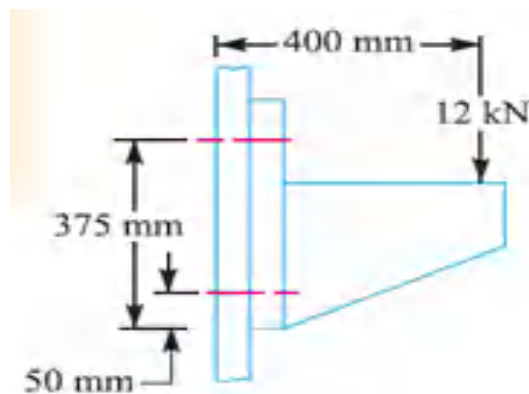
1. The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force of 5 kN. Find the diameter of bolt required according to 1. Maximum principal stress theory 2. Maximum shear stress theory and 3. Maximum distortion energy theory. Take permissible tensile stress at elastic limit = 100 MPa and poisson's ratio = 0.3. 14M

(OR)

2. a) A circular bar of 500 mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20 kN and a maximum value of 50 kN. Determine the diameter of bar by taking a factor of safety of 1.5, size effect of 0.85, surface finish factor of 0.9. The material properties of bar are given by : ultimate strength of 650 MPa, yield strength of 500 MPa and endurance strength of 350 MPa. 10M
- b) Illustrate how the stress concentration in a component can be reduced? 4M

UNIT-II

3. a) Explain the concept of 'Bolts of uniform strength' in screwed joints? 4M
- b) For supporting the travelling crane in a workshop, the brackets are fixed on steel columns as shown in Fig. below. The maximum load that comes on the bracket is 12 kN acting vertically at a distance of 400 mm from the face of the column. The vertical face of the bracket is secured to a column by four bolts, in two rows (two in each row) at a distance of 50 mm from the lower edge of the bracket. Determine the size of the bolts, if the permissible value of the tensile stress for the bolt material is 84 MPa. Also find the cross-section of the arm of the bracket which is rectangular 10M

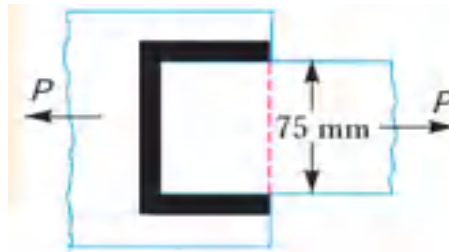


(OR)

4. Explain the Design procedure of screw Jack? 14M

UNIT-III

5. a) Define following terms relating to Riveted Joints: 4M
1. Pitch 2. Back pitch 3. Diagonal pitch and 4. Margin.
- b) A double riveted double cover butt joint in plates 20 mm thick is made with 25 mm diameter rivets at 100 mm pitch. The permissible tensile, compressive and shear stresses are: 120 MPa, 100 MPa and 150 MPa. Find the efficiency of joint, 10M
- (OR)**
6. a) What are the different Lap welded joints? Explain with neat sketches? 5M
- b) A plate 75 mm wide and 12.5 mm thick is joined with another plate by a single transverse weld and a double parallel fillet weld as shown in Fig. below. The maximum tensile and shear stresses are 70 MPa and 56 MPa respectively. Find the length of each parallel fillet weld, if the joint is subjected to static loading? 9M



UNIT-IV

7. a) Derive an expression for torsional strength of shaft? 4M
- b) Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5. 10M
- (OR)**
8. Design and draw a protective type of cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m. and having an allowable shear stress of 40 MPa. The working stress in the bolts should not exceed 30 MPa. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 MPa. 14M

UNIT-V

9. Design a socket and spigot type cotter joint to support a load varying from 30 kN in compression to 30 kN in tension. The material used is carbon steel for which the following allowable stresses may be used. The load is applied statically. Tensile stress = compressive stress = 50 MPa ; shear stress = 35 MPa and crushing stress = 90 MPa. 14M
- (OR)**
10. A helical compression spring made of oil tempered carbon steel is subjected to a load which varies from 400 N to 1000 N. The spring index is 6 and the design factor of safety is 1.25. If the yield stress in shear is 770 MPa and endurance stress in shear is 350 MPa, find: 1. Size of the spring wire, 2. Diameters of the spring, 3. Number of turns of the spring, and 4. Free length of the spring. The compression of the spring at the maximum load is 30 mm. The modulus of rigidity for the spring material may be taken as 80 kN/mm². 14M

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SET-1

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

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

**DIGITAL COMMUNICATIONS
(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 Quantization and show that the quantization error in PCM is $\Delta^2/12$ 7 M
- b) Explain how non-uniform quantization is achieved through Companding in PCM system. 7 M

(OR)

2. a) A signal having bandwidth equal to 5KHz is sampled, quantized and coded by a PCM system with 256 quantization levels. Determine codeword length, transmission bandwidth, bit rate and output signal to noise ratio in dB. 6 M
- b) Draw the block diagram of Delta Modulator and explain each block. Give the condition to avoid slope overload in Delta Modulation. 8 M

UNIT-II

3. a) Illustrate the generation of BPSK modulation with the help of block diagram. 8 M
- b) Obtain the expression for probability of error of ASK Receiver. Compare it with the probability of errors of PSK and FSK 6 M

(OR)

4. a) Explain the DPSK modulation process and encode the data stream 101100011110 using DPSK modulator. What are the advantages of DPSK over BPSK. 8 M
- b) Obtain the expression for probability of error of matched filter Receiver. 6 M

UNIT-III

5. a) A source transmits two independent messages with probabilities of P and (1-P) respectively. Prove that the entropy is maximum when both the messages are equally likely. 6 M
- b) A source with 6 emitting messages A,B,C,D,E having probabilities $P(A) = 1/3$, $P(B) = 1/4$, $P(C) = P(D) = 1/8$, $P(E) = P(F) = 1/12$. Find coding efficiency using Huffman coding. 8 M

(OR)

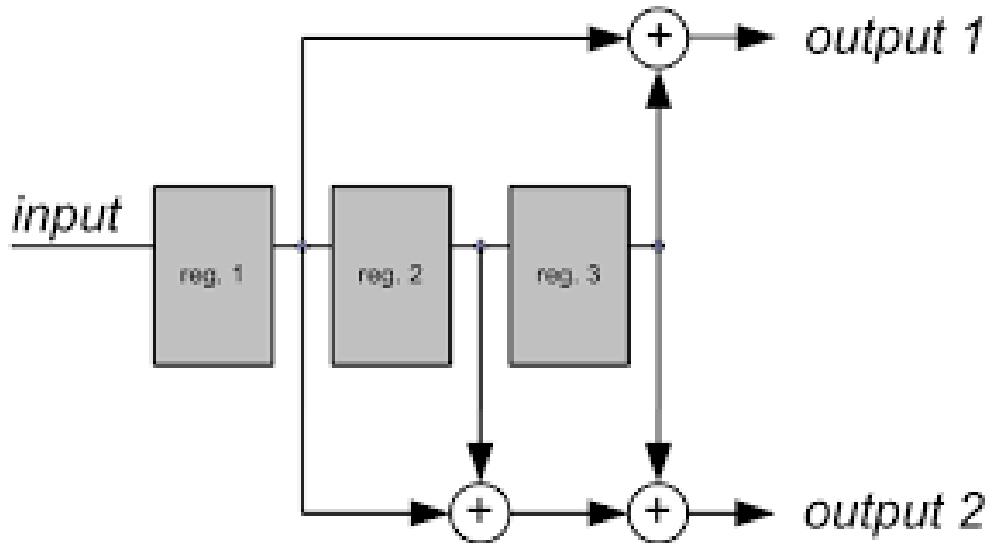
6. a) What is the significance of Entropy in information theory? Prove the Entropy relation $H(XY) = H(Y/X) + H(X)$. 5 M
- b) Derive the Channel capacity of Gaussian Channel using Shannon-Hartley Theorem. 9 M

UNIT-IV

7. a) A (7,4) block code is generated by using a generator matrix 7 M
- $$\begin{array}{l} 1\ 0\ 0\ 0 : 1\ 1\ 0 \\ 0\ 1\ 0\ 0 : 1\ 1\ 1 \\ 0\ 0\ 1\ 0 : 1\ 0\ 1 \\ 0\ 0\ 0\ 1 : 0\ 1\ 1 \end{array}$$
- Find the following:
- Parity check matrix
 - Code vector for a message block (1011)
- b) Explain how syndrome helps in correcting the error in block codes. 7 M
- (OR)**
8. a) Define the following: 6 M
- Minimum distance of a code.
 - Code weight.
 - Code efficiency.
- b) Determine the Parity check matrix and generator matrix of a block code with minimum distance of 3 and a message block of size 8 bits. 8 M

UNIT-V

9. a) For a convolutional encoder with $g_1=[100]$, $g_2=[111]$ and $g_3=[101]$, draw the state diagram and determine the output code word in transform domain approach for message $u=[10100]$ 8 M
- b) Compare linear block codes and convolutional codes 6 M
- (OR)**
10. a) Sketch the state diagram for the given convolutional encoder. 6 M



- b) Decode the given sequence 11 01 01 10 01 of a convolutional code with a code rate of $r=1/2$ and constraint length $K=3$, using viterbi decoding algorithm. 8 M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

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

UNIX INTERNALS

(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) Explain the file handling utilities with examples 7M
b) Discuss the following commands with syntax? 7M
i) tee ii) chmod iii) umask iv) tar v) telnet
(OR)
2. a) Explain the text processing utilities with examples 7M
b) Discuss the following commands with syntax 7M
i) mv ii) cp iii) du iv) awk v) ln

UNIT-II

3. Write a short note on 14M
i) pipe ii) redirection operators
iii) conditional statements
(OR)
4. a) Write a shell script to display first n numbers of Fibonacci series 7M
b) Write a shell script to display the multiplication table of the given number 7M

UNIT-III

5. Explain file and directory maintenance system calls 14M
(OR)
6. What is a system call? Explain the following system calls 14M
i) open ii) create iii) read iv) write v) close vi) stat vii) dup

UNIT-IV

7. Explain following functions? 14M
i) pause ii) abort iii) sleep iv) kill v) fork vi) alarm vii) exit()
(OR)
8. Explain in detail about zombie process and orphan process with an examples. 14M

UNIT-V

9. Briefly explain about IPC mechanisms? 14M
(OR)
10. a) Whenever a pipe act as Two-Way communication 7M
b) What is a semaphore? How it is used for interprocess communication 7M

AR13

CODE: 13CE3013

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

GEOTECHNICAL ENGINEERING-I
(Civil Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. Briefly explain the following
 - a) Relative density
 - b) Soil structure
 - c) Capillary rise
 - d) Seepage through soils
 - e) Stress distribution in soils
 - f) Westergaard's theories
 - g) Mechanism of compaction
 - h) Consolidation
 - i) Shear strength of soils
 - j) Liquefaction

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2.
 - a) Comment on significance and importance for Toughness Index **6 M**
 - b) Write short note on Textural classification **6 M**

(OR)
3. Enumerate the types of soil samples and distinguish them **12 M**

UNIT-II

4. The coefficient of permeability of soil sample is found to be 1×10^{-3} cm/sec at a voids ratio of 0.4. Estimate its permeability at a voids ratio of 0.6 **12 M**

(OR)
5.
 - a) Discuss about Darcy's law and its validity **6 M**
 - b) Explain about Falling head Permeability test **6 M**

UNIT-III

6. A more accurate method of determining the vertical stress at any point under a uniformly loaded area of any shape is with the help of influence diagram. Discuss **12 M**

(OR)
7.
 - a) Draw the contact pressure distribution diagrams on clay soil for rigid and flexible footings **6 M**
 - b) Explain the construction procedure of Newmark's chart and its usage **6 M**

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SET-1

UNIT-IV

8. a Consolidation settlement can be computed by two methods. Discuss **6 M**
b Factors affecting compaction **6 M**
(OR)
9. Estimate the assumptions made by Terzaghi's one dimensional consolidation analysis **12 M**

UNIT-V

10. Explain the modified Mohr-Coulomb's theory. **12 M**
(OR)
11. Explain the following **12 M**
i) Critical Void Ratio ii) Shear Strength of Sands

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

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

**POWER SYSTEMS – II
(Electrical and Electronics Engineering)**

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is proximity effect?
- b) What is bundling of conductors?
- c) What is the effect of earth on capacitance of conductors in overhead transmission lines?
- d) Define voltage regulation of a transmission line.
- e) What are the causes of voltage drop and line loss in a transmission line?
- f) What are the units of generalized constants of transmission line?
- g) What is a travelling wave?
- h) What is Ferranti effect?
- i) State significance of string chart.
- j) What are the methods used to improve string efficiency?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Starting with flux linkage concept, derive an expression for inductance of a single phase 2-wire transmission line. 6 M
- b) Determine the inductance per km of a 3-phase transmission line using 20mm diameter conductors when conductors are situated at the corners of a triangle with spacing of 4, 5 and 6 metres. Conductors are regularly transposed. 6 M

(OR)

3. a) Derive expression for line to line capacitance and line to neutral capacitance of a single phase 2-wire line. 6 M
- b) Determine the capacitances of a 3-phase single circuit transmission line with conductors are placed on same horizontal plane and 4m apart when (i) effect of earth is neglected (ii) effect of earth is considered. The height of the conductors from ground is 10m and radius of each of the conductors is 2cm. 6 M

UNIT-II

4. a) Using nominal- π method, derive the efficiency and regulation of a medium transmission line with phasor diagram. 6 M
- b) Determine A, B, C, D constants for 3-phase 80 km, 50 Hz transmission line with series impedance of $(0.15+j0.78) \Omega$ per km and a shunt capacitance of $j5 \times 10^{-6}$ mho per km. use nominal-T configuration. 6 M

(OR)

5. a) A single phase line is transmitting 1,100 kW power to a factory at 11 kV and at 0.8 power factor lagging. It has a total resistance of 2Ω and loop reactance of 3Ω . Determine (i) voltage at sending end (ii) percentage regulation (iii) transmission efficiency. 6 M
- b) Derive A, B, C, D constants of a medium length transmission line and prove that $AD-BC=1$. 6 M

UNIT-III

6. a) Using rigorous method derive expression for sending end voltage and current for long transmission line. 8 M
b) Explain surge impedance of a transmission line. 4 M

(OR)

7. a) Determine A, B, C, D constants for 3-phase, 50Hz transmission line of 200km long having the following distributed parameters: $L=1.20 \times 10^{-3} \text{H/km}$, $C=8 \times 10^{-9} \text{F/km}$, $R=0.15 \Omega/\text{km}$, $G=0$. 6 M
b) Discuss the phenomenon of wave reflection and refraction in a transmission line. 6 M

UNIT-IV

8. a) Explain the variation of current and voltage on an overhead line when one end of the line is open circuited and at other end a source of constant emf V is switched in. 6 M
b) An overhead transmission line with surge impedance of 400Ω is 300km long. One end of this line is short circuited and at the other end a source of 11kV is suddenly switched in. calculate the current at the source end 0.005 sec after the voltage is applied. 6 M

(OR)

9. a) Write a short note on : 6 M
(i) Skin effect (ii) advantages of bundled conductors for overhead transmission lines (iii) Radio Interference.
b) Discuss the factors on which corona loss depends. Suggest different means of reducing corona loss. 6 M

UNIT-V

10. a) Name the different types of insulators used in overhead lines. Explain about any two in detail. 6 M
b) Each conductor of a 33kV, 3-phase system is suspended by a string of three similar insulators; the capacitance of each disc is nine times the capacitance to ground. Calculate the voltage across each insulator. Determine the string efficiency also. 6 M

(OR)

11. a) Show how the sag of an overhead line conductor can be calculated in case of supports at different levels. 6 M
b) A transmission line conductor having a diameter of 19.5mm weighs 0.85 kg/m. the span is 275 metres. The wind pressure is 39 kg/m^2 of projected area with ice coating of 13mm. the ultimate strength of the conductor is 8,000kg. Calculate the minimum sag if the factor of safety is 2 and ice weighs 910 kg/m^3 . 6 M

AR13

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SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

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

DIGITAL COMMUNICATIONS

(Electronics and Communication Engineering)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) What is meant by quantization.
b) Explain slope overload distortion.
c) What is M-ary PSK.
d) Write the expression for $\text{erfc}(u)$
e) What is meant by deterministic channel.
f) What is Kraft inequality.
g) What are Hamming codes.
h) Explain Advantage of cyclic codes.
i) What are burst errors
j) What is meant by convolution code.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a. Define Quantization and show that the quantization error in PCM is $\Delta^2/12$ 6M
b. Explain how non-uniform quantization is achieved through Companding in PCM system. 6M

(OR)

3. a. A signal having bandwidth equal to 5KHz is sampled, quantized and coded by a PCM system with 256 quantization levels. Determine codeword length, transmission bandwidth, bit rate and output signal to noise ratio in dB. 6M
b. Draw the block diagram of Delta Modulator and explain each block. Give the condition to avoid slope overload in Delta Modulation. 6M

UNIT-II

4. a. Illustrate the generation of BPSK modulation with the help of block diagram. 6M
b. Obtain the expression for probability of error of ASK Receiver. Compare it with the probability of errors of PSK and FSK 6M

(OR)

5. a. Explain the DPSK modulation process and encode the data stream 101100011110 using DPSK modulator. What are the advantages of DPSK over BPSK. 6M
b. Obtain the expression for probability of error of matched filter Receiver. 6M

UNIT-III

6. a. A source transmits two independent messages with probabilities of P and (1-P) respectively. Prove that the entropy is maximum when both the messages are equally likely. 5M
b. A source with 6 emitting messages A,B,C,D,E having probabilities $P(A) = 1/3$, $P(B) = 1/4$, $P(C) = P(D) = 1/8$, $P(E) = P(F) = 1/12$. Find coding efficiency using Huffman coding. 7M

(OR)

7. a. What is the significance of Entropy in information theory? Prove the Entropy relation $H(XY) = H(Y/X) + H(X)$. 6M
b. Derive the Channel capacity of Gaussian Channel using Shannon-Hartley Theorem. 6M

UNIT-IV

8. a. A (7,4) block code is generated by using a generator matrix 6M

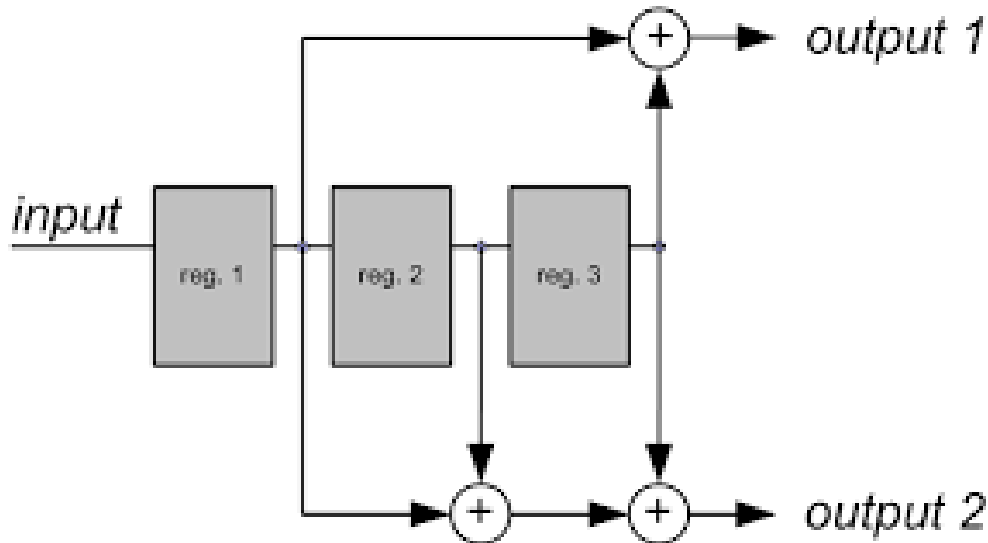
$$\begin{array}{l} 1\ 0\ 0\ 0 : 1\ 1\ 0 \\ 0\ 1\ 0\ 0 : 1\ 1\ 1 \\ 0\ 0\ 1\ 0 : 1\ 0\ 1 \\ 0\ 0\ 0\ 1 : 0\ 1\ 1 \end{array}$$

Find the following:

- i. Parity check matrix
 - ii. Code vector for a message block (1011)
- b. Explain how syndrome helps in correcting the error in block codes. 6M
- (OR)**
9. a. Define the following: 6M
- i) Minimum distance of a code.
 - ii) Code weight.
 - iii) Code efficiency.
- b. Determine the Parity check matrix and generator matrix of a block code with minimum distance of 3 and a message block of size 8 bits. 6M

UNIT-V

10. a. For a convolutional encoder with $g_1=[100]$, $g_2=[111]$ and $g_3=[101]$, draw the state diagram and determine the output code word in transform domain approach for message $u=[10100]$ 8M
- b. Compare linear block codes and convolutional codes 4M
- (OR)**
11. a. Sketch the state diagram for the given convolutional encoder. 6M



- b. Decode the given sequence 11 01 01 10 01 of a convolutional code with a code rate of $r=1/2$ and constraint length $K=3$, using viterbi decoding algorithm. 6M