

AR16

CODE: 16CE3011

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, January-2019

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) As per the Indian Standard Soil Classification (IS:1478-1970), what is the expression for A-line? 4M
b) A fine grained soil has 60% (by weight) clay content. The soil behaves as semi-solid when the water content is between 15% and 28%. The soil behaves fluid-like when the water content is more than 40%. What is the Activity of Soil? 10M
- (OR)
2. a) What are the different minerals primarily governs the swelling behaviour of black cotton soil? 6M
b) In its natural condition, a soil sample has a mass of 1.980 kg and a volume of 0.001 m³. After being completely dried in an oven, the mass of the sample is 1.800 kg. Specific gravity is 2.7, Unit weight of water is 10 kN/m³. What is the degree of saturation? 8M

UNIT-II

3. a) What are the factors affecting co-efficient of permeability? 2M
b) A soil has a discharge velocity of 3×10^{-7} m/s and void ratio of 0.5. What is the seepage velocity? 6M
c) If during a permeability test on a soil sample with a falling head permeameter equal time intervals are noted for a drop of head from L_1 and L_2 and against L_2 and L_3 . What will be the relation between L_1 , L_2 , and L_3 ? 6M
- (OR)
4. a) The flow net for an earth dam with 30 m water depth consists of 25 potential drops and 5 flow channels. If the discharge per meter length of dam is 0.00018 m³/sec, then what is the coefficient of permeability of dam material? 7M
b) A soil deposit has three layers having same thickness each but the permeability of the layers is in the ratio of 1:2:4 from top to bottom. What is the ratio of average permeability in the horizontal direction to that in the vertical direction? 7M

UNIT-III

5. a) A vertical concentrated force of 40 kN is acting at a point on the ground surface. Determine the vertical stress intensities due to this load at a depth of 2.5 m below GL on the line of action of load and at a depth of 1.5 m below GL and a radial distance of 3m. 7M

- b) A rectangular footing with dimensions of 2m x 3m has to carry a uniformly distributed load of 100 kN/m^2 . Plot the distribution of vertical stress intensity due to this load on a horizontal plane at a depth of 2 m below the base of the footing by 2:1 dispersion method. 7M

(OR)

6. a) What is Newmark's Chart? How is it helpful in computing the vertical stress at any depth due to a loaded area? 7M
- b) Determine the vertical stress intensity at a point 3m below the ground level and 2.5 m away from the line of action of a vertical point load of 150 kN acting on the ground surface by Boussinesq's method. 7M

UNIT-IV

7. a) Differentiate between primary and secondary consolidations 6M
- b) A laboratory compaction test on soil having specific gravity equal to 2.67 gave a maximum dry unit weight of 17.8 kN/m^3 and a water content of 15%. Determine the degree of saturation, air content and percentage air voids at the maximum dry unit weight. What would be theoretical maximum dry unit weight corresponding to zero air voids at the optimum water content? 8M

(OR)

8. a) Compaction by vibratory roller is best method of compaction for which soils? 2M
- b) There is a bed of compressible clay of 4 m thickness with pervious sand on top and impervious rock at the bottom. In a consolidation test in the laboratory on an undisturbed specimen of clay from this deposit, 90% settlement was reached in 4 hours. The specimen was 20 mm thick. Estimate the time in years for the building founded over this deposit to reach 90% of its final settlement. 6M
- c) The maximum dry density of a sample by light compaction test is 1.80 g/cc at an optimum water content of 14.5 %. Find the air voids and the degree of saturation. $G=2.67$. 6M

UNIT-V

9. a) In a triaxial shear test conducted on a soil sample having cohesion of 12 kN/m^2 and angle of shearing resistance of 36° , the cell pressure was 200 kN/m^2 . Determine the value of the deviator stress at failure 7M
- b) Two drained triaxial tests are performed on the material. In the first test the all-round pressure is 200 kN/m^2 and failure occurs at an added axial stress of 600 kN/m^2 . In the second test all-round pressure is 350 kN/m^2 and failure occurs at an added axial stress of 1050 kN/m^2 . What values of c' and ϕ' correspond to these results? 7M

(OR)

10. a) Differentiate the Consolidated Drained and Consolidated Undrained Triaxial test, w.r.t. field conditions. 7M
- b) Calculate the potential shear strength on a horizontal plane at a depth of 3 m below the surface in a formation of cohesionless soil when the water table is at a depth of 3.5 m. The degree of saturation may be taken as 0.5 on the average. Void ratio = 0.50; grain specific gravity = 2.70; angle of internal friction = 30° . What will be the modified value of shear strength if the water table reaches the ground surface? 7M

AR16

CODE: 16EE3014

SET-2

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

III B.Tech I Semester Supplementary Examinations, January-2019

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) Develop the equation for Re-striking Voltage, RRRV. 7M
- b) A 50 Hz 3-Phase alternator with grounded neutral has an inductance of 1.6 mH per phase and is connected to the bus-bar through a circuit breaker. The capacitance to earth of the circuit between the alternator and the circuit breaker is $0.0032\mu\text{F}$ per phase. Due to a short on the bus-bars the breaker opens when the rms value of the current is 8000 A. Determine the following 7M
 - i) Frequency of oscillations
 - ii) Active recovery voltage
 - iii) Time for maximum RRRV and iv) Maximum RRRV

(OR)

2. a) Explain the principle and operation of Vacuum circuit breaker with neat sketch. 6M
- b) Justify the properties of SF_6 gas which make it a better arc quenching medium. Explain the working of SF_6 circuit breaker. 8M

UNIT-II

3. a) Describe different types of distance relays used for protection of transmission line of power system. Which one is the best and why? 7M
- b) The calculation short-circuit current through a feeder is 1,200A. An over current relay of rating 5A is connected for the protection of the feeder through a 1000/5 A CT. Calculate the operating time of the relay when it has a plug setting of 50% and time setting of 0.8. The characteristic of the relay is follows: 7M

PSM	1.3	2.4	4	6	10	20
Operating times(sec)	30	10	6.5	3.5	3	2.2

(OR)

4. a) Explain with a sketch the operation of a induction type impedance relay. 7M
- b) What is static relay? What are the advantages and limitations of static relay over electromagnetic relays. 7M

UNIT-III

5. a) Discuss about the Merz-price protection for alternator stator windings faults with suitable diagrams. 7M
- b) A 6.6 kV, 10 MVA star connected alternators has a reactance of 2 ohms per phase and negligible resistance. Merz-Price protection is used for protection of winding. The neutral grounding resistance is 5 ohms. If only 10% of winding is to remain unprotected, determine the setting of the relay. 7M

(OR)

6. a) What are incipient faults? Explain the construction and operation of a Buchholz's relay. 7M
- b) A 3 phase transformer rated for 33/6.6 kV is connected star-delta and the protecting current transformer on low voltage side have a ratio of 400/5A. Determine the ratio of the current transformer on the high voltage side. 7M

UNIT-IV

7. a) Describe differential over current protection for bus-bar. 7M
- b) What are the different bus-bar arrangements possible in a substation? Sketch the different bus-bar arrangements. 7M

(OR)

8. a) Explain the time graded and current graded systems in over current protection. 7M
- b) Explain tanslay protection schemes for a 3-phase feeder with a Sketch. 7M

UNIT-V

9. a) Explain construction, working of valve type lightning arrester. 7M
- b) What is lightning? Explain the operation of Zno lightning arrester. 7M

(OR)

10. a) What is the necessity of neutral earthing? Explain neutral earthing. 7M
- b) Discuss the merits of 7M
- i) Reactance grounding ii) Resonant grounding

**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. a) Write the significance of the preferred number 4
- b) Hollow shaft of 40 mm outer diameter and 25 mm inner diameter is subjected to a twisting moment of 120 N-m, simultaneously, it is subjected to an axial thrust of 10 kN and a bending moment of 80 N-m. Calculate the maximum compressive and shear stresses. 10

(OR)

2. a) Explain the steel specifications with an example 4
- b) A bar of circular cross section is subjected to alternating tensile forces varying from a minimum of 300KN to a maximum of 600KN . It is to be manufactured of a material with an ultimate tensile strength of 850 MPa and an endurance limit of 650MPa. Determine the diameter of the bar using safety factors of 3.5 related to ultimate tensile strength and 4 related to endurance limit and a stress concentration of 1.65 for fatigue load. Use Goodman straight line as basis for design. 10

UNIT-II

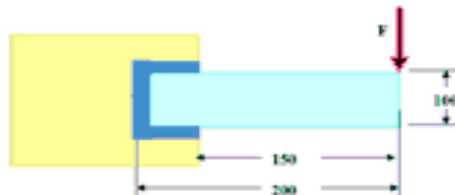
3. a) Define pre-stress in bolts. Mention the application of pre-stress 4
- b) A square tie bar 20mm X 20mm in section carries a load. It is attached to a bracket by means of 6 bolts . Calculate the diameter of bolt if the maximum stress in the tie bar is 150N/mm^2 and in the bolts is 75 N/mm^2 . 10

(OR)

4. a) Derive an expression for efficiency of screw jack. 7
- b) A single square thread power screw is to raise a load of 50 KN. A screw thread of major diameter of 34 mm and a pitch of 6 mm is used. The coefficient of friction at the thread and collar are 0.15 and 0.1 respectively. If the collar frictional diameter is 100 mm and the screw turns at a speed of 1 rev s⁻¹ find (a) the power input to the screw. (b) the combined efficiency of the screw and collar. 7

UNIT-III

5. a) Differentiate between parallel fillet welds and transverse fillet welds. 4
- b) A rectangular steel plate is welded as a cantilever to a vertical column and supports a single concentrated load of 60 kN as shown in figure below. Determine the weld size if the allowable shear stress in the weld material is 140 MPa. 10

**(OR)**

6. a) Differentiate between lap joint and butt joint. 4
 b) Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell 1.5 m in diameter subjected to a steam pressure of 0.95 N/mm^2 . Assume joint efficiency as 75%, allowable tensile stress in the plate 90 MPa ; compressive stress 140 MPa ; and shear stress in the rivet 56 MPa. 10

UNIT-IV

7. Design a muff coupling to connect two shafts transmitting 40 kW at 120 r.p.m. The permissible shear and crushing stress for the shaft and key material (mild steel) are 30 MPa and 80 MPa respectively. The material of muff is cast iron with permissible shear stress of 15 MPa. Assume that the maximum torque transmitted is 25 per cent greater than the mean torque. 14

(OR)

8. A steel shaft 800 mm long transmitting 15 kW at 400 r.p.m. is supported at two bearings at the two ends. A gear wheel having 80 teeth and 500 mm pitch circle diameter is mounted at 200 mm from the left hand side bearing and receives power from a pinion meshing with it. The axis of pinion and gear lie in the horizontal plane. A pulley of 300 mm diameter is mounted at 200 mm from right hand side bearing and is used for transmitting power by a belt. The belt drive is inclined at 30° to the vertical in the forward direction. The belt lap angle is 180 degrees. The coefficient of friction between belt and pulley is 0.3. Design and sketch the arrangement of the shaft assuming the values of safe stresses as : $\tau = 55 \text{ MPa}$; $\sigma_t = 80 \text{ MPa}$. Take torsion and bending factor 1.5 and 2 respectively. 14

UNIT-V

9. It is required to design a knuckle joint to connect two circular rods subjected to an axial tensile force of 50 KN. The rods are co-axial and a small amount of angular movement between their axes is permissible. Design the joint and specify the dimensions of its components. Select suitable materials for the parts. Assume allowable yield stress as 400 N/mm^2 and factor of safety as 5. 14

(OR)

10. A railway wagon moving at a velocity of 1.5 m/s is brought to rest by a bumper consisting of two helical springs arranged in parallel. The mass of wagon is 1500 kg. The springs are compressed by 150mm in bringing wagon to rest. The spring index can be taken as 6. The springs are made of oil hardened and tempered steel wire of SW grade ($G = 81.37 \text{ KN/mm}^2$) The constants A and m for calculating permissible shear stress are 1855 and 0.187 respectively. The permissible shear stress for the spring wire can be taken as 50 % of ultimate tensile strength. Design the spring and calculate i) wire diameter ii) Mean coil diameter iii) number of active coils iv) total number of coils v) Solid length vi) free length vii) Pitch of the coil viii) Required spring rate and ix) Actual spring rate. 14

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) List the advantages of digital communication over analog communication. 7M
- b) What is the necessity of non-uniform quantization? Explain two companding techniques. 7M

(OR)

2. a) Discuss the advantages of DPCM over PCM. 6M
- b) Describe and illustrate Delta modulation and its quantization error. 8M

UNIT-II

3. a) With neat sketch explain Base band signal receiver 7M
- b) Derive the relation for error probability of binary ASK 7M

(OR)

4. a) What is matched filter? How it differs from optimum filter? Derive an Expression for impulse response of matched filter. 7M
- b) Derive the expression for probability of error of ASK. 7M

UNIT-III

5. a) Explain the mutual information and its properties. 7M
- b) Write short notes on the capacity of continuous channels. 7M

(OR)

6. a) Define Entropy and explain the properties of Entropy. 7M
- b) Illustrate the Huffman coding in detail along with example. 7M

UNIT-IV

7. a) Discuss about the matrix representation of Linear Block codes. 7M
- b) What is the use of syndrome? Draw the $(n-k)$ syndrome calculation circuit for (n,k) cyclic code and explain its operation. 7M

(OR)

8. a) With an example explain the error correction capability using Hamming codes. 7M
- b) Explain the procedure of Binary cyclic codes with one example. 7M

UNIT-V

9. a) Explain convolution codes using transform domain approach with example. 7M
- b) Briefly describe about the Code tree and State Diagram for a Convolution Encoder. 7M

(OR)

10. a) What is the significance of Trellis structure? Explain. 7M
- b) Explain the decoding technique of convolution code in detail. 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) With the help of syntax and example explain the various process utility commands 7M
- b) Distinguish between grep, egrep and fgrep. 7M
- (OR)
2. a) Describe in detail about the disk utility commands and backup utility commands 7M
- b) Give brief description about the file handling utilities. 7M

UNIT-II

3. a) Write shell script to print given numbers in reverse order. (eg. If no is 321 it must print as 123) 7M
- b) Explain the different special variables present in Bourne shell. 7M
- (OR)
4. a) Write shell script to see current date, time, username and current directory 7M
- b) Distinguish between local and environment variables 7M

UNIT-III

5. What is a directory? List and explain various directory maintenance systems calls that are present in unix. 14M
- (OR)
6. a) Explain fseek, fopen, fclose system call in detail. 7M
- b) Describe in detail about the various types of dup system calls. 7M

UNIT-IV

7. a) Explain the role of the following system calls with respect to process: i) fork() ii) Wait() iii) Exec() 7M
- b) What is a process? Draw and explain the structure of a typical process 7M
- (OR)
8. a) Describe in detail about the exit, exec and waitpid system calls 7M
- b) Differentiate between fork and vfork system calls. 7M

UNIT-V

9. a) Explain how to achieve the inter process communication by using FIFOs 7M
- b) What is a semaphore? Explain the operations that are supported by it. 7M
- (OR)
10. a) What is Pipe? Write a program to create a pipe between a parent and its child and send the data between them through pipe. 7M
- b) Write about message queues. 7M

PART-A**ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Write down the relationship between dry density, specific gravity, density of water and void ratio of a soil.
- b) Define soil structure.
- c) Define critical hydraulic gradient.
- d) What is the difference between discharge velocity and seepage velocity?
- e) State any two assumptions of Boussinesq's theory.
- f) Mention any one difference between Westergaard's and Boussinesq's theory.
- g) What is pre consolidation pressure?
- h) Name any two methods of compaction adopted in the field.
- i) State Mohr Coulomb failure theory.
- j) Define liquefaction of soils.

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

2. a) What are consistency limits? Explain. 6M
- b) A soil has plastic limit of 20% and plasticity index of 25%. If natural water content of soil is 10%, what is the liquidity index and consistency index? 6M

(OR)

3. a) Give major soil deposits in India. 6M
- b) What is three-phase system of soil, explain with diagram. 6M

UNIT-II

4. a) What is Permeability? Explain capillary rise in soils? 6M
- b) Determine the average horizontal and vertical permeabilities of a soil. Mass made up of three horizontal strata, each 1m thick, if the coefficients of permeabilities are 1×10^{-1} mm/sec, 3×10^{-1} mm/sec and 8×10^{-2} mm/sec for the three layers. 6M

(OR)

5. a) Define i) effective stress ii) pore water pressure iii) quick sand condition 6M
- b) Explain procedure for determining permeability of soil, by falling head permeameter. 6M

UNIT-III

6. a) Explain Boussinesq's theory in detail with a sketch. 6M
- b) A circular footing 2m radius transmits a uniform pressure of 100 kN/m². Calculate vertical stress at a point 3m clearly beneath the centre. 6M

(OR)

7. a) Discuss Newmark's influence chart and its uses with a neat sketch. 6M
- b) Explain Westergaard's theory for point load. 6M

UNIT-IV

8. a) Explain compressibility of soils in detail. 6M
- b) Describe the standard Proctor's compaction test with relevant sketches. 6M

(OR)

9. a) What is consolidation ? Discuss various factors affecting consolidation. 7M
- b) In a consolidation test the following results have been obtained. When the pressure was changed from 50kPa to 100 kPa, the void ratio changed from 0.7 to 0.65. Determine the compression Index (Cc). 5M

UNIT-V

10. a) Explain about the terms critical void ratio and liquefaction 6M
- b) An unconfined compression test is conducted on a saturated clay sample 38 mm in diameter and 80 mm in height. The load at failure is 41.65 N and axial deformation is 12 mm. Calculate the unconfined compressive strength & undrained shear strength. 6M

(OR)

11. a) Explain with neat sketches Mohr-Coulombs failure theory. 7M
- b) Explain Vane Shear Test. 5M

AR13

CODE: 13EE3014

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, January-2019

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 skin effect?
b) What is meant by GMR of a conductor?
c) Write classification of lines based on their length of transmission.
d) What is the relationship between A, B, C, D constants in any transmission line?
e) What is surge impedance loading?
f) What is meant by transposition of line conductors?
g) Why velocity of wave propagation on all overhead lines is same?
h) What is visual critical voltage?
i) Define the term sag in a transmission line.
j) What is string efficiency?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Explain the concept of self GMD and mutual GMD for evaluating inductance of transmission line. 6M
b) Determine the inductance per phase per km of a double circuit 3-phase line. The radius of each conductor is 20 mm and the conductors are placed on the circumference of an imaginary circle of radius 7 m forming a regular hexagonal figure. 6M

(OR)

3. a) Explain the method of images for the calculation of capacitance of a single phase 2-wire transmission line. 6M
b) A 3-phase line is operated at 50 Hz; the conductor diameter is 0.6 cm. find the inductance and capacitance per km when conductors are situated at corners of triangle with spacing of 2, 3 and 2 metres. Conductors are regularly transposed. 6M

UNIT-II

4. a) Draw the phasor diagram of a short transmission line and derive expression for voltage regulation and efficiency. 6M
b) 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 2 Ω and loop reactance of 3 Ω . Determine (i) voltage at sending end (ii) percentage regulation (iii) transmission efficiency. 6M

(OR)

5. a) Evaluate generalized circuit constants for medium line using nominal T-method. 6M
- b) A 50 Hz, 3-phase transmission line is 200 km long. It has a total series impedance of $(35+j140) \Omega$ and shunt admittance of $930 \times 10^{-6} \angle 90^\circ \text{S}$. It delivers 40 MW power at 220 kV with 0.9 power factor lagging. Find the magnitude of the sending end voltage. Consider nominal- π model of the line. 6M

UNIT-III

6. a) Show that a travelling wave moves along an overhead line with velocity of light. 6M
- b) Obtain equivalent π model of a long transmission line. 6M

(OR)

7. a) A long transmission line has the following auxiliary constants: $A=D=0.945 \angle 1.02^\circ$, $B=82.3 \angle 73.03^\circ \Omega$ and $C=0.001376 \angle 90.4^\circ \text{S}$. Determine equivalent T-network. 6M
- b) Determine A, B, C, D constants for 3-phase, 50Hz transmission line of 200km long having the following distributed parameters: $L=1.20 \times 10^{-3} \text{H/km}$, $C=8 \times 10^{-9} \text{F/km}$, $R=0.15 \Omega/\text{km}$, $G=0$. 6M

UNIT-IV

8. a) A long transmission line is open circuited at the receiving end. Will there be any current in the line sending end? Explain. 6M
- b) A surge of 100 kV travelling in a line of natural impedance 600Ω arrives at a junction of two lines of impedances 800Ω and 200Ω respectively. Find surge voltage and currents transmitted into each of the branch lines. 6M

(OR)

9. a) Make the analysis of a wave travelling along a line terminated with a capacitance. 6M
- b) Discuss advantages and disadvantages of corona. How can corona loss be minimized? 6M

UNIT-V

10. a) Explain the methods for improving string efficiency in a string of insulators. 6M
- b) A suspension string has 3 units. Each unit can withstand a peak voltage of 11kV. The capacitance of each joint and metal work is 20% of the capacitance of each disc. Find (i) maximum line voltage for which the string can withstand. (ii) String efficiency. 6M

(OR)

11. a) Show how the effect of wind and ice loading are taken into account while determining the sag and stress of an overhead line conductor. 6M
- b) Show how the sag of an overhead line conductor can be calculated in case of supports at different levels. 6M

Time: 3 Hours**Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) Mention two applications of rolling contact bearings
- b) What do you mean by thrust bearing ?
- c) What is the function of connecting rod ?
- d) What is the manufacturing method of crank shaft ?
- e) Why is piston clearance required ?
- f) In a flat belt drive, the belt can be subjected to a maximum tension (T) and centrifugal tension (T_c). What is the condition for transmission of maximum tension ?
- g) What is law of gearing ?
- h) Mention the range of helix angle for single helical gears.
- i) What is the condition for self locking in power screws ?
- j) What is the condition for self locking in power screws ?

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

2. a) Why is hydrodynamic bearing called “self-acting” bearing? 4M
 - b) A full journal bearing operating under a steady load has the following specifications: 8M
journal diameter = 60 mm, bearing length = 60 mm, radial load on bearing = 2.8 kN,
journal speed = 1020 rpm, radial clearance = 0.05 mm, viscosity of oil = 80×10^{-9} N-s/mm², density of oil = 860 kg/m³, specific heat of oil = 1.76 kJ/kg-°C. Determine (i) Sommerfield number (ii) Power loss in friction (iii) Temperature rise if heat generated is entirely carried by oil (iv) Minimum film thickness.
- (OR)**
3. a) In hydrodynamic bearing, what are factors which influence the formation of wedge? 4M
 - b) The radial reaction on a bearing is 8000 N. It also carries a thrust of 5000 N. The shaft diameter is 140 mm and it rotates at 1700 rpm. Outer ring is stationery. Load is smooth, 8 hours/day for a life of 17000 hours. (i) Select a deep groove ball bearing (ii) What is the rated 90% life of the selected bearing? (iii) For $b = 1.34$ compute the probability of the selected bearing surviving 17000 hours. 8M

UNIT-II

4. a) Explain the concept of buckling of connecting rod. 4M
 - b) Determine the dimensions of an I-section connecting rod for a petrol engine from the following data: 8M
Diameter of the piston = 110 mm; Mass of the reciprocating parts = 2 kg; Length of the connecting rod from centre to centre = 325 mm; Stroke length = 150 mm; R.P.M. = 1500 with possible overspeed of 2500; Compression ratio = 4 : 1; Maximum explosion pressure = 2.5 N/mm².
- (OR)**
5. a) Differentiate between centre and over hung crank shaft 3M
 - b) Design a side crankshaft for a 500 mm × 600 mm gas engine. The weight of the flywheel is 80 kN and the explosion pressure is 2.5 N/mm². The gas pressure at maximum torque is 0.9 N/mm² when the crank angle. is 30°. The connecting rod is 4.5 times the crank radius. 9M
Any other data required for the design may be assumed.

UNIT-III

6. a Enumerate the functions of engine cylinder 4M
b The bore of cylinder of a cylinder of four-stroke diesel engine is 120 mm. The maximum gas pressure inside the cylinder is limited to 4 MPa. The cylinder head is made of cast iron and allowable tensile stress is 40 N/mm². Determine the thickness of cylinder head. The studs, which are made of steel, have allowable stress as 50 N/mm². Calculate: (i) number of studs (ii) nominal diameter of studs (iii) pitch of studs 8M

(OR)

7. a Derive an expression to determine the pitch diameter of sprocket wheel for the given number of teeth, pitch and pitch angle of a chain 4M
b A flat belt drive is required to transmit 10 kW from a motor running at 1000 rpm. The belt is 15 mm thick and has a mass density of 0.001 gm/mm³. Permissible tensile stress for the belt material is 2.5 N/mm². Diameter of the driving pulley is 250 mm, whereas the speed of the driven pulley is 400 rpm. Driving and driven shafts are 1.25 m apart. The coefficient of friction between belt and pulley may be taken as 0.25. Determine the width of the belt for safe working 8M

UNIT-IV

8. a “Gear drive is a positive drive”. Why? 4M
b It is required to design a pair of spur gears with 20° full depth involute consisting of a 20 teeth pinion meshing with a 50 teeth gear. The pinion shaft is connected to a 22.5 kW, 1450 rpm electric motor. The material for the pinion is plain carbon steel FG410 ($\sigma_{ut}=410$ N/mm²) while the gear is made of grey cast iron FG200 ($\sigma_{ut}=200$ N/mm²). Design the gears based on Lewis equation and velocity factor to account for the dynamic load. 8M

(OR)

9. a Discuss a force analysis in a spur gear drive. 4M
b A pair of parallel helical gears consists of 18 teeth pinion meshing with a 63 teeth gear. The normal module is 3 mm. The helix angle is 23° while the normal pressure angle is 20°. Calculate: 8M
(i) Transverse module ii) Transverse pressure angle and iii) Axial pitch

UNIT-V

10. a Show that the efficiency of self locking screws is less than 50 percent. 4M
b The mean diameter of the square threaded screw having pitch of 10mm is 50mm. a load of 20KN is lifted through a distance of 170 mm. find the work done in lifting the load and the efficiency of the screw. When (i)The load rotates with the screw, and (ii) The load rests on the loose head which does not rotate with the screw, The external and internal diameter of the bearing surface of the loose head are 60mm and 10mm. the coefficient of friction for screw and the bearing surface is 0.08. 8M

(OR)

11. a What are the important forms of thread used in power screw? Explain with neat sketches. 4M
b A vertical square threads screw of a 70 mm mean diameter and 10 mm pitch supports a vertical load of 50 KN. It passes through the boss of a spur gear wheel of 70 teeth which acts as a nut. In order to raise the load, the spur gear wheel is turned by means of a pinion having 20 teeth. The mechanical efficiency of pinion and gear wheel drive is 90%. The axial thrust on the screw is taken by a collar bearing having a mean radius of 100 mm. The coefficient of friction for the screw and nut is 0.15 and that for collar bearing is 0.12. Find (a) torque to be applied to the pinion shaft, (b) maximum principal and shear stresses in the screw and (c) height of nut, if the bearing pressure is limited to 12 N/mm². 8M

AR13

CODE: 13EC3014

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, January-2019

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 are advantages of ADM system?
b) What is the condition to avoid slope overload distortion?
c) Define M-ary system.
d) How DPSK is different from PSK?
e) What is probability of bit error.
f) Define Hamming Distance.
g) Define entropy.
h) What are disadvantages of ASK system
i) Define optimum receiver.
j) What is Non coherent detection?

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a) Draw block diagram of PCM system and explain each block in detail. 6M
b) What is the necessity of non-uniform quantization and explain companding. 6M
- (OR)
3. a) Discuss the advantages of DM over PCM. 4M
b) Explain quantization error and derive an expression for maximum SNR in PCM system that uses Linear quantization. 8M

UNIT-II

4. a) Compare PSK,DPSK and QPSK signalling schemes with neat diagrams 4M
b) Explain about ASK system and derive the relation for error probability of binary ASK 8M
- (OR)**
5. a) Compare probability of error of different modulation techniques 6M
b) Explain the generation and reception of DPSK signal with example. 6M

UNIT-III

6. a) Explain the mutual information and its properties 6M
b) Write short notes on the capacity of continuous channels 6M
- (OR)**
7. a) Calculate band width limits of Shannon –Hartley theorem? 6M
b) Explain the trade off between bandwidth and signal to noise ratio. 6M

UNIT-IV

8. a) Explain encoding procedure of Linear Block codes. 6M
b) What is the use of syndrome? Draw the (n-k) syndrome calculation circuit for (n,k) 6M
- (OR)**
9. a) a) Compare linear block codes and cyclic codes with an example. 6M
b) b) Explain about Block codes in which each block of k message bits encoded in to n bits with an example. 6M

UNIT-V

10. a) a)What is Convolution codes. How it is generated? 6M
b) b) Briefly describe about the Code tree, Trellis and State Diagram for a 6M
- (OR)**
11. Draw the state diagram, tree diagram, and trellis diagram for $k=3$, rate $1/3$ 12M
Code generated by $g_1(x) = 1+x^2$, $g_2(x) = 1+x$ and $g_3(x) = 1+x+x^2$.