

**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) A soil sample is tested for liquid limit using Casagrande's apparatus and the following data is obtained from the test. Determine the liquid limit of soil. 2M

Water Content (%)	43.1	45.1	47.5	49.5	51.9	53.9
No. of Blows (N)	60	45	38	25	20	13

- b) The natural void ratio of sand sample is 0.6 and its density index is 0.6. If its void ratio in the loosest state is 0.9, then what will be the void ratio in the densest state? 6M
- c) For a given sandy soil, $e_{\max} = 0.72$, $e_{\min} = 0.46$, and $G_s = 2.68$. What will be the moist unit weight of compaction (kN/m^3) in the field if $D_r = 78\%$ and $w = 9\%$ 6M

(OR)

2. a) Keep the shrinkage limit, liquid limit, and plastic limit of a cohesive soil in descending order? 2M
- b) If Uniformity coefficient, $C_u = 9$, and coefficient of curvature, $C_c = 1$ for a soil, what will the ratio of D_{30}/D_{10} ? 6M
- c) A soil sample of 3.81cm diameter and 7.62cm height is collected from the field and observed the wet weight of 1.668N and oven dry weight of 1.4N from the laboratory. Also observed the specific gravity as 2.7 in the laboratory. Evaluate the bulk unit weight, dry unit weight, void ratio and degree of saturation 6M

UNIT-II

3. a) For a saturated sand deposit, the void ratio and specific gravity of solids are 0.7 and 2.67 respectively. What is critical hydraulic gradient for the deposit? 2M
- b) A non-homogeneous soil deposit consists of a silt layer sandwiched between a fine sand layer at top and clay layer below. Permeability of silt layer is 10 times the permeability of the clay layer and $1/10^{\text{th}}$ permeability of sand layer. Thickness of silt layer is 2 times the thickness of sand layer and $2/3^{\text{rd}}$ thickness of clay layer. What is the ratio of equivalent horizontal and equivalent vertical permeability of the deposit? 6M
- c) A soil block is 12 cm long and 8 cm² in cross-section from a fixed level. The water level at one end of block is 15 cm and on the other end is 2 cm with a flow rate of 2 cm³/minute. What is the soil permeability? 6M

(OR)

4. a) If the effective size of soil particles is 0.5 cm, what will be the coefficient of permeability? 2M
- b) A clay layer 3.66 m thick rests beneath a deposit of submerged sand 7.92 m thick. The top of the sand is located 3.05 m below the surface of a lake. The saturated unit weight of the sand is 19.62 kN/m³ and the clay is 18.36 kN/m³. Evaluate the total stress, pore water pressure and the effective stress at the middle of the clay layer. 6M
- c) In a falling head permeameter, a soil sample of 65 mm in diameter and 50 mm in length was tested. At the beginning of the test, the head was 80 cm, and after 1 hour, the head falls to 30 cm. if the diameter of the stand pipe is 1 cm, what will be the coefficient of permeability in cm/sec? 6M

UNIT-III

5. a) Describe the Newmark's chart and its application. 7M
b) A column of a building transfers a concentrated load of 225 kN to the soil in contact with the footing. Estimate the vertical pressure at the following points by making use of the Boussinesq and Westergaard equations. 7M
(i) Vertically below the column load at depths of 1.5, 3.0, and 4.5 meters.
(ii) At radial distances of 1.5, 3.0 and 6.0 meters and at a depth of 3.0 meters.

(OR)

6. a) A square footing of 3.5 x 3.5 meters is founded at a depth of 1.5 meters below the ground level. The imposed pressure at the base is 1200 kN/m². Determine the vertical pressure at a depth of 7 meters below the ground surface on the center line of the footing. 5M
b) A concentrated load of 22.5 Kn acts on the surface of a homogeneous soil mass of a large extent. Find the stress intensity at a depth of 3m,6m,9m,12m and 15m directly below the point load. Draw the vertical stress distribution diagram along vertical axis 9M

UNIT-IV

7. a) Define coefficient of consolidation. How is it related to the coefficient of permeability of a soil? 2M
b) OMC-SP and MDD-SP denote the optimum moisture content and maximum dry density obtained from standard proctor compaction test, respectively. OMC-MP and MDD-MP denote the optimum moisture content and maximum dry density obtained from the modified proctor compaction test, respectively. Give the comparison of OMC and MDD for both the tests. 7M
c) What are the various assumptions made in Terzaghi's one dimensional consolidation? 5M

(OR)

8. a) Describe spring analogy based on the terzghis primary consolidation. 7M
b) The mass of a moist soil sample collected from the field is 465 grams, and its oven dry mass is 405.76 grams. The specific gravity of the soil solids was determined in the laboratory to be 2.68. If the void ratio of the soil in the natural state is 0.83, find the following: 7M
i. The moist density of the soil in the field (kg/m³)
ii. The dry density of the soil in the field (kg/m³)
iii. The mass of water, in kilograms, to be added per cubic meter of soil in the field for saturation

UNIT-V

9. a) The principal stresses at a point in a material are 100 kN/m² and 50 kN/m². Determine the Normal, Shear and Resultant Stress on a plane inclined at 35° to the major principal plane. Also find, for this plane, the maximum value of Obliquity. 7M
b) An unconsolidated undrained triaxial test was carried out on a sample of dry sand, prepared with special techniques. Under a cell pressure of 200 kPa, shear failure of the sample occurred when the deviator stress reached 438.6 kPa. Determine the shear parameters of the soil? 7M

(OR)

10. a) Classify triaxial tests from the point of view of drainage characteristics. Briefly describe the essential features of each. 6M
b) The following test data obtained from a triaxial test. 8M

Test No.	Chamber pressure (kN/m ²)	Deviator stress (kN/m ²)	Pore pressure at max. deviator stress (kN/m ²)
1	80	175	45
2	150	240	50
3	210	300	60

Determine the total and effective stress parameters of the soil.

AR16

CODE: 16EE3014

SET-1

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

III B.Tech I Semester Regular Examinations, October- 2018

**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) Explain the phenomenon of current chopping in a circuit breaker. 7M
b) From the following data of a 50Hz generator emf to neutral 7.5kV (rms), reactance of generator and connected system 4Ω , distributed capacitance to neutral $0.01\mu\text{F}$, resistance negligible: find
(i) The maximum voltage across the contacts of the circuit breaker when it breaks a short-circuit current at zero current
(ii) The frequency of transient oscillation; and
(iii) Average rate of rise of restricting voltage up to the first peak of oscillation.

(OR)

2. a) Explain the principle and operation of Minimum oil circuit breaker with neat sketch. 7M
b) What are the special features of an auto reclosing circuit breaker? What are its advantages? 7M

UNIT-II

3. a) Figure shows a radial distribution system having identical IDMTL over current relay at A, B and C. For a time delay step of 0.5 second, calculate the time multiplier settings at A and B. 8M

IDMTL relay characteristic is given below:

PSM	2	3	5	10	20
Time (in seconds)	10	6	4.5	3	2



CT Ratios	200/5	200/5	100/5
Plug setting current	5A	2.5A	2.5A
Time multiplier Setting	--	--	0.1

- b) Explain the working of percentage differential relays. 6M

(OR)

4. a) Derive the universal torque equation and obtain the torque equation for all relays. 8M
- b) What is static relay? Write advantages of static relay over electromagnetic relays. 6M

UNIT-III

5. a) Explain briefly the different types of faults in an alternator. 7M
 - b) An 11KV,100 MVA Alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay set to operate when there is 20% out of balance current. Determine the value of the resistance to be placed in the neutral to ground connection. 7M
- (OR)**
6. a) Discuss the percentage differential protection scheme of a transformer. 7M
 - b) A 3 phase 66/11 kV star-delta connected transformer is protected by merz-price system. The CTs on low voltage side have a ratio of 420/5A. Find the ratio of the CTs on the high voltage side. 7M

UNIT-IV

7. a) Explain the differential protection of bus bars. 7M
 - b) Write short notes on the following 7M
 - i) Necessity of busbar protection.
 - ii) Requirements of line protection.
- (OR)**
8. a) Explain three-zone protection of transmission lines. 7M
 - b) With a neat sketch, explain the concept of phase comparison carrier current protection of a transmission line and also list the advantages over other protection schemes. 7M

UNIT-V

9. a) Discuss the causes of over voltages in power system. 6M
 - b) What is a Zno arrester? Explain how It's works. 8M
- (OR)**
10. a) Discuss the merits of 7M
 - i) Solid grounding
 - ii) Resistance grounding
 - b) What is a voltage surge? Draw a typical standard lightning voltage surge. 7M

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

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UNIT-I

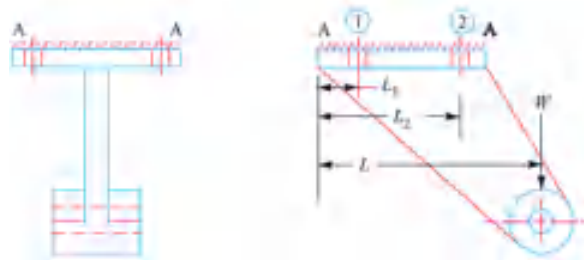
1. a) Explain the General Procedure in Machine Design? 5M
- b) A cast iron pulley transmits 10 kW at 400 r.p.m. The diameter of the pulley is 1.2 metre and it has four straight arms of elliptical cross-section, in which the major axis is twice the minor axis. Determine the dimensions of the arm if the allowable bending stress is 15 MPa. 9M

(OR)

2. a) Explain the following terms in connection with design of machine members subjected to variable loads:(a) Endurance limit, (b) Size factor,(c) Surface finish factor, and (d) Notch sensitivity. 4M
- b) A simply supported beam has a concentrated load at the centre which fluctuates from a value of P to $4P$. The span of the beam is 500 mm and its cross-section is circular with a diameter of 60 mm. Taking for the beam material an ultimate stress of 700 MPa, a yield stress of 500MPa, endurance limit of 330 MPa for reversed bending and a factor of safety of 1.3, calculate the maximum value of P . Take a size factor of 0.85 and a surface finish factor of 0.9. 10M

UNIT-II

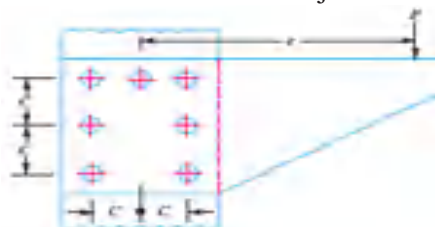
3. a) Explain any two locking Devices with neat sketches? 4M
- b) A bracket, as shown in Fig, supports a load of 30 kN. Determine the size of bolts, if the maximum allowable tensile stress in the bolt material is 60 MPa. The distances are: $L_1 = 80$ mm, $L_2 = 250$ mm, and $L = 500$ mm. 10M

**(OR)**

4. Explain different stresses in power screws? 14M

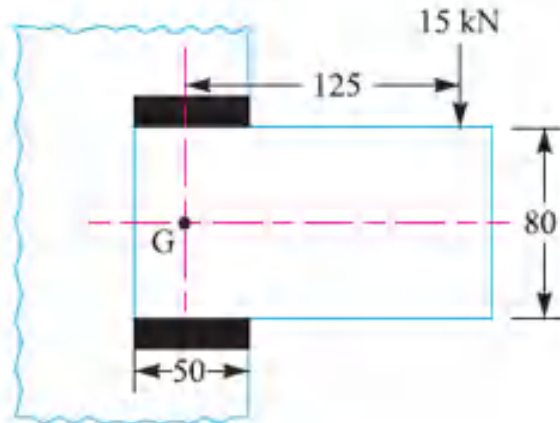
UNIT-III

5. An eccentrically loaded lap riveted joint is to be designed for a steel bracket as shown in Fig. below. The bracket plate is 25 mm thick. All rivets are to be of the same size. Load on the bracket = 50 kN; rivet spacing, $C = 100$ mm; load arm, $e = 400$ mm. Permissible shear stress is 65 MPa and crushing stress is 120 MPa. Determine the size of the rivets to be used for the joint 14M



(OR)

6. a) Write the advantages of welded joints over riveted joints? 5M
b) A bracket carrying a load of 15 kN is to be welded as shown in Fig. below. Find 9M
the size of weld required, if the allowable shear stress is not to exceed 80 MPa.



UNIT-IV

7. a) Define the terms the equivalent bending moment & equivalent twisting moment? 2M
b) Design a shaft to transmit power from an electric motor to a lathe head stock 12M
through a pulley by means of a belt drive. The pulley weighs 200 N and is located at 300 mm from the centre of the bearing. The diameter of the pulley is 200 mm and the maximum power transmitted is 1 kW at 120 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors for bending and twisting are 1.5 and 2.0 respectively. The allowable shear stress in the shaft may be taken as 35 MPa

(OR)

8. a) What are different Types of Shafts Couplings? 4M
b) Design a muff coupling which is used to connect two steel shafts transmitting 40 10M
kW at 350 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 40 MPa and 80 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 15 MPa

UNIT-V

9. Design a knuckle joint to transmit 150 kN. The design stresses may be taken as 75 14M
MPa in tension, 60 MPa in shear and 150 MPa in compression.

(OR)

10. a) Explain the Material used for Helical Springs? 4M
b) A helical spring is made from a wire of 6 mm diameter and has outside diameter 10M
of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2 , find the axial load which the spring can carry and the deflection per active turn.

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

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UNIT-I

1. a) Explain the advantages of digital communication systems over analog systems. 7M
b) With neat diagram, explain adaptive modulation and demodulation in detail. 7M
- (OR)**
2. a) What is meant by quantization? Derive expression for signal to quantization noise ratio in PCM system. 7M
b) With neat sketch explain the principle and operation of DPCM. 7M

UNIT-II

3. a) Compare BASK, BPSK and BFSK signalling schemes with neat diagrams. 7M
b) Explain the non-coherent detection method of BPSK system. 7M
- (OR)**
4. a) Draw the block diagram of QPSK modulator and Demodulator and explain operation. 7M
b) Derive the expression for probability of error of FSK. 7M

UNIT-III

5. a) Explain the concept of amount of information and its properties. 7M
b) State and prove Shannon Hartley theorem. 7M
- (OR)**
6. a) Discuss Shannon- Fano and Huffman coding algorithms with an example and compare them. 7M
b) Write short notes on the capacity of Gaussian channel 7M

UNIT-IV

7. a) Explain encoding procedure of Linear Block codes 7M
b) Design a decoder with shift registers implementation by considering an example. 7M
- (OR)**
8. a) With neat sketch explain the procedure for Syndrome calculation 7M
b) What are cyclic codes? List the advantages and disadvantages of cyclic codes. 7M

UNIT-V

9. a) Explain convolution codes using time domain approach with example. 7M
b) Write the advantages and disadvantages of convolutional codes 7M
- (OR)**
10. a) What are different decoding methods of convolution codes and explain them 7M
b) Explain the viterbi algorithm for the decoding of convolution codes. 7M

AR16

CODE: 16CS3011

SET-2

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

III B.Tech I Semester Regular Examinations, October- 2018

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) Illustrate about Unix file system in detail. 7
b) Discuss about networking commands with examples. 7
- (OR)**
2. a) Explain about head, tail, & uniq commands with example 7
b) Explain commands for changing file permissions and ownership 7

UNIT-II

3. a) Explain about shell meta characters in brief. 7
b) Write a shell script to find sum of n natural numbers using command line arguments 7
- (OR)**
4. a) What is a shell variable? Illustrate about user defined and system variables 7
b) Explain about loops with examples. 7

UNIT-III

5. Discuss about file access System calls in detail. 14
- (OR)**
6. Explain about standard I/O functions (OR) C-Library functions. 14

UNIT-IV

7. Discuss about process control in Unix in detail. 14
- (OR)**
8. a) Write short notes on reliable and unreliable signals 7
b) Explain in detail about zombie process. 7

UNIT-V

9. Discuss about process communication in pipes in detail. 14
- (OR)**
10. a) What is a shared memory? How it is used for interprocess communication 7
b) Explain about parent-child process. 7

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

1. a) What is adsorbed water layer?
b) What are alluvial soils?
c) List out factors affecting permeability.
d) Write about seepage through soils.
e) State any two assumptions of Westergaard's theory.
f) Define pressure bulb.
g) Define compaction. Mention any two factors that affect compaction of soils.
h) What is secondary consolidation of a soil mass?
i) Distinguish between unconsolidated un drained test and consolidated un drained test
j) Mention any two limitations of direct shear test.

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

2. a) What are the index properties? Name the Index properties of cohesionless and cohesive soils. 6M
b) Draw the typical grain size distribution curve of a coarse grained soil and a uniformly graded soil. 6M

(OR)

3. a) A loose un compacted sand fill has a density index of 40%. Laboratory tests indicated that the minimum and maximum void ratios of the sand are 0.56 and 0.90 respectively. Specific gravity is 2.65. What is the field dry unit weight of the sand? 6M
b) Explain soil formation and its relation with geological aspects. 6M

UNIT-II

4. a) Explain in detail the concept of Flow nets with neat diagrams. 7M
b) In a falling head permeability test on a sample of 12.2 cm height and 44.41 cm^2 C/S area, the water level in a stand pipe of 6.25 mm internal diameter dropped from a height of 75cm to 24.7 cm in 15 min. Find the co-efficient of permeability of soil sample. 5M

(OR)

5. a) Explain the effective stress principle. 5M
- b) Explain permeability of layered soils in two cases 7M
 - (i) when flow is perpendicular to bedding planes
 - (ii) when flow is parallel to bedding planes.

UNIT-III

6. a) What is an Isobar Diagram? Explain vertical stress distribution on a horizontal plane. 5M
- b) A concentrated load of 40 kN acts on the surface of a soil. 7M
Determine the vertical stress increment at point directly beneath the load at a depth of 10 m using both Boussinesq's and Westergaard's theories.

(OR)

7. a) What are the essential differences between Boussinesq's and Westergaard's analysis. 5M
- b) Explain the procedure of preparation of Newmarks chart for an influence value of 0.005. 7M

UNIT-IV

8. a) Discuss the effect of compaction on 6M
 - i) soil structure ii) permeability iii) shrinkage and swelling
- b) Explain the spring analogy for primary consolidation? 6M

(OR)

9. a) Define OMC, MDD, Zero Air Void line. Also explain about field compaction and quality control. 6M
- b) State the assumptions made in Terzaghi's one dimensional Consolidation theory. 6M

UNIT-V

10. a) A triaxial compression test on a cohesive sample cylindrical in shape yields the following stresses: Major Principal Stress----- 8MN/m^2 , Minor principal stress---- 2MN/m^2 . Angle of inclination of rupture plane is 60° to the horizontal. Find the cohesion and angle of internal friction. 7M
 - b) What is Mohr's circle? How is it useful? 5M
- (OR)**
11. a) Explain the test procedure of triaxial compression test. 7M
 - b) Write short notes on Kempton's pore pressure parameters. 5M

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

1. a) What are the different types of conductors?
b) What is skin effect?
c) What is mean by Surge impedance loading?
d) What is reason for Ferranti effect?
e) What is the range of surge impedance for an overhead line and underground cable?
f) What is the effect of shunt capacitance in the string efficiency
g) Define radio interference
h) Write the Advantages of bundle conductors for overhead transmission lines
i) Define sag.
j) List out various types of insulators used for overhead transmission lines.

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

2. a) Derive expressions for the inductance per phase of a 3-ph line with unsymmetrical spacing (assume transposition) 6M
b) A single phase line of 250V, 50Hz has conductor spacing of 1.5 meters. The diameter of each conductor is 1.5cm. calculate (i) Capacitance of the line for a length of 50km and (ii) charging current. 6M
- (OR)**
3. a) Derive expressions for capacitance of a single phase two wire system. 6M
b) Explain the concept of self GMD and mutual GMD for evaluating inductance of transmission lines 6M

UNIT-II

4. a) Derive the A,B,C,D parameters of medium lines from Nominal T method? 6M
b) A 3-Phase ,50HZ transmission line 100Km long delivers 20MW at 0.9 p.f lagging and at 110kv .The resistance and reactance of the line per phase per km are 0.2Ω and 0.4Ω respectively ,While capacitance admittance is 2.5×10^{-6} siemen/km/phase. Calculate (i) the current and voltage at the sending end (ii) efficiency of transmission .Use nominal π method 6M

(OR)

5. a) Define regulation of a transmission line and derive the approximate expression for the regulation of a short transmission line. 6M
- b) Define the generalized A,B,C,D constants of a transmission line and determine their values for short and medium transmission lines 6M

UNIT-III

6. a) Explain surge impedance loading with respect to an overhead transmission line 6M
- b) What is an equivalent circuit of long line? Derive expression for parameters of this circuit in terms of line parameters. 6M

(OR)

7. a) Starting from the fundamentals determine the equivalent- T network parameters of a long transmission line. 6M
- b) A 132kV, 3-phase, 50Hz transmission line 200km long has the following distributed parameters. 6M
 $l = 1.3 \times 10^{-3} \text{ H/km}$; $c = 9 \times 10^{-9} \text{ F/km}$; $r = 0.2 \text{ } \Omega/\text{km}$; $g = 0$;
 find the efficiency when delivering 50MVA at 0.8 p.f lagging.

UNIT-IV

8. a) Explain reflection and refraction coefficients of a line with different conditions. 6M
 - b) Explain the effect of shunt compensation in transmission line. 6M
- (OR)**
9. a) Explain in detail about the reflection on a line not terminated in its characteristic impedance (Z_0). 6M
 - b) Explain the factors affecting corona and reduction of corona loss. 6M

UNIT-V

10. a) Discuss any two methods to increase the value of string efficiency, with suitable sketches. 6M
 - b) Write a short note on (i) effect of Wind and ice loading on calculation of sag and (ii) sag template. 6M
- (OR)**
11. a) Derive the expression for sag and tension when the supports are at unequal heights 6M
 - b) An insulator string has three units each having a safe working voltage of 15kV, the ratio of unit self capacitance to stray capacitance of earth is 10:1. Calculate the string efficiency. 6M

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

1. a) Why are roller bearings called 'antifriction bearings' ?
- b) A sliding contact bearing which can support steady loads without any relative motion between the journal and bearing is called _____
- c) Name the material used for connecting rod.
- d) Why are connecting rods made of I section ?
- e) Name the materials for piston rings.
- f) What is creep in belt ?
- g) Write the Lewis equation for beam strength of gear teeth ?
- h) What is herringbone helical gear ?
- i) What is the condition for overhauling in power screws
- j) If α and ϕ denote the lead angle and angle of friction respectively, the efficiency of the screw is given by _____

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

2. a Explain with reference to a neat plot the importance of the bearing characteristic curve 4M
- b Design a journal bearing for a centrifugal pump for the following data: Load on the journal = 20000 N; Speed of the journal = 900 rpm; Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.17 N/m-s; Ambient temperature = 15.5°C; Maximum bearing pressure = 1.5 N/mm². Calculate also mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient = 1232 W/m²/°C. 8M

(OR)

3. a Differentiate sliding contact and rolling contact bearings. 4M
- b A bearing of an axial flow compressor is to carry a radial load of 2500 N and thrust of 1500 N. The service imposes light shock and the bearing will be in use for 40 hours/week for 5 years. The speed of the shaft is 1000 rpm. Select suitable ball bearing for the purpose and give the required tolerances on the shaft and the housing. Diameter of the shaft is 50 mm. 8M

UNIT-II

4. a What are the forces acting on connecting rod ? 4M
- b Design cross section of the connecting rod of a petrol engine running at 1200 rpm for the following data: diameter of piston = 90 mm, length of connecting rod = 300 mm, stroke = 90 mm, mass of reciprocating parts = 2.25 kg, the maximum explosion pressure = 2.2 MPa. The rod is of I-section of width 4t and depth equal to 5t where t is the thickness of a web and flanges. The material of connecting rod is steel for which yield stress in compression is 330 MPa. Take factor of safety equal to 5 and $E = 2.1 \times 10^5$ MPa. Rankine constant = $\frac{1}{7500}$. 8M

(OR)

5. a Where do you use over hung crank shafts ? 3M
- b Design a plain carbon steel centre crankshaft for a single acting four stroke, single cylinder engine for the following data: 9M
Piston diameter = 250 mm; Stroke = 400 mm; Maximum combustion pressure = 2.5 N/mm²; Weight of the flywheel = 16 kN; Total belt pull = 3 N; Length of connecting rod = 950 mm. When the crank has turned through 30° from top dead centre, the pressure on the piston is 1 N/mm² and the torque on the crank is maximum.
Any other data required for the design may be assumed.

UNIT-III

6. a What are the functions of compression piston rings ? 4M
b Following data is given for the piston of a four-stroke diesel engine: 8M
Cylinder bore = 250 mm
Material of piston rings = Grey cast iron
Allowable tensile stress = 100 N/mm^2
Allowable radial pressure on cylinder wall = 0.03MPa
Thickness of piston head = 42 mm
Number of piston rings = 4
Calculate:
(i) Radial width of piston rings
(ii) Axial thickness of piston rings
(iii) Gap between the free ends of piston ring before assembly
(iv) Gap between the free ends of piston ring after assembly
(v) Width of top land
(vi) Width of ring grooves
(vii) Thickness of piston barrel; and
(viii) Thickness of barrel at open end

(OR)

7. a Enlist the merits and demerits of V-belt over the flat belt drive 3M
b Design a flat belt drive system for the following specifications: Power to be transmitted = 100 kW, Pulley diameters = 0.8 m and 1 m respectively, Centre distance between the pulleys = 3 m, Belt speed = 20 m/s, Coefficient of friction between the belt and pulleys = 0.3, Slip = 1.2% at each pulley, Density of leather belt material = 1000 kg/m^3 , Safe stress for the belt = 2.5 MPa, Thickness of the belt = 12 mm. Take into account the effect of centrifugal tension. Find the width and the length of the belt. Draw a schematic diagram of the belt drive. 9M

UNIT-IV

8. a Derive an expression for beam strength of a spur gear tooth (Lewis equation) using standard notations 4M
b A pair of Spur gears is to transmit 20 kW when the pinion rotates at 300 rpm. The velocity ratio is 3:1. The allowable static stresses for the pinion and gear are 120 MPa and 100 MPa respectively. The pinion has 15 teeth and its face width is 14 times the module. Determine a) module b) face width and c) pitch circle diameters for both pinion and gears. 8M

(OR)

9. a Analyse why the tangential component of gear tooth force is called “useful” component 4M
b Design a pair of helical gears to transmit 30kW power at a speed reduction ratio of 4:1. The input shaft rotates at 2000 rpm. Take helix and pressure angles equal to 25° and 20° respectively. The number of teeth on the pinion may be taken as 30. Assume the material and necessary parameters. 8M

UNIT-V

10. a Derive an expression for efficiency of square threaded screw. 5M
b A square threaded bolt of mean diameter 24 mm and pitch 5 mm is tightened by screwing a nut, whose mean diameter of bearing surface is 50 mm. If the coefficient of friction for nut and bolt is 0.1 and that for nut and bearing surface is 0.15, find the force required at the end of spanner 0.5 m long, when the load on the bolt is 12 kN. 7M

(OR)

11. a Derive an expression for torque required for lifting the load in the case of power screw. 4M
b In a large gate valve used in a high pressure water line, the gate weighs 5 kN and the friction, due to water pressure and causing resistance to opening is 2.5 kN. The valve stem is 38mm in diameter. The valve stem is non-rotating and is raised by a rotating wheel with internal threads acting as a rotating nut on the valve stem which is fitted with square threads of 7mm pitch. The wheel presses against a supporting collar of 38mm inside diameter and 76mm outside diameter. Assume the coefficient for threads to be 0.15 and for the collar 0.25. 8M
(a) Determine the efficiency of the screw and collar
(b) Determine the torsional moment that must be applied to the wheel to raise the load

AR13

CODE: 13EC3014

SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Supplementary Examinations, October, 2018

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 waveform coding .
b) What is meant by 1-bit version of DPCM.
c) Draw the ASK waveform for data=[1, 0 1, 1]
d) What is the advantage of DEPSK.
e) What are the units of information
f) Write the limits of Entropy of an M-ary source.
g) What are systematic linear block codes.
h) Explain Forward error correction techniques.
i) What is meant by constraint length in convolutional codes
j) Write the relationship between free distance and error correction capability in convolutional codes.

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. a. Draw the block diagram of Digital Communication system, and explain each block 6M
b. A television signal with a bandwidth of 4.2 MHz is transmitted using binary PCM. The number of quantization levels is 512. Calculate i) code word length ii) Transmission bandwidth. iii) Final bitrate. iv) Output signal to quantization noise ratio. 6M

(OR)

3. a. Draw the block diagram of Delta modulation system, and explain the operation. 6M
b. If $m_p = 20V$ and 256 quantizing levels are employed, what is the voltage between levels when there is no compression? For $\mu = 255$, what is the smallest and what is the largest effective separation between levels? 6M

UNIT-II

4. The bit stream 1011100011 is to be transmitted using DPSK. Determine the transmitted sequence and encoded sequence. 6M
Explain the working of Binary frequency shift keying with neat block diagram 6M

(OR)

5. a. Sketch the QPSK waveform for the sequence 1101010010, assuming the carrier frequency equal to bit rate. 6M
b. Draw and derive the PSD of BPSK, and explain the bandwidth requirement. 6M

UNIT-III

6. a. Prove the properties of Average Mutual Information. 6M
b. An analog signal having 4KHz bandwidth is sampled at 1.25 times the nyquist rate, and each sample is quantized into one of equally likely levels. Assume that the successive samples are statistically independent. 6M
(i) What is the information rate of the source?
(ii) Can the output of this source be transmitted without error over a AWGN channel with a bandwidth of 10 KHz and S/N ratio of 20dB.

(OR)

7. Find the capacity of a channel of Infinite Bandwidth. Draw the bandwidth efficiency diagram, and indicate Shannon's limit. 9M
Explain Shannon-Fano coding technique procedure. 3M

UNIT-IV

8. a. Design a (7,4) cyclic encoder with generator polynomial $g(x)=1+x^2+x^3$ 6M
b. Taking x^3+x+1 as the generator polynomial for the (7,4) cyclic linear block code, determine the code vectors in systematic form for the following message sequences: (i) 1011 (ii) 1111 6M

(OR)

9. a. Explain the encoding procedure for linear block code. 6M
b. A (13,5) linear cyclic code has the generator polynomial $g(x) = 1+x+x^5+x^8$. 6M
Draw the block diagrams of an encoder and syndrome calculation circuits for this code.

UNIT-V

10. a. Draw the state diagram, tree diagram, trellis diagram for $k=3$, rate $1/3$ code generated by $g_1(x)=1+x^2$, $g_2(x)=1+x$, $g_3(x)=1+x+x^2$ 6M
b. Explain time domain approach of convolution codes. 6M

(OR)

11. a. Explain Viterbi decoding of convolution codes. 6M
b. A Convolution encoder has a single-shift register with 2 stages, (i.e., Constraint length $K=3$), three modulo-2 adders, and an output multiplexer. The generator sequences of the encoder are as follows: $g^{(1)}=(1,0,1)$, $g^{(2)}=(1,1,0)$ & $g^{(3)}=(1,1,1)$. Draw the trellis diagram for this convolution encoder. 6M

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****III B.Tech I Semester Supplementary Examinations, October, 2018****INDUSTRIAL MANAGEMENT SCIENCE
(Common to CSE & IT)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 X 10 = 10 M]**

1. a) Functions of Management.
b) Define Motivation.
c) What is partnership?
d) Features of Joint Stock Company.
e) Define Law of Demand
f) What is Test Marketing?
g) What is Iso-costs?
h) Write a short note on BEA?
i) Define Monopolistic competition.
j) What are the different Pricing Strategies?

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

2. Explain Douglas McGregor's Theory X and Theory Y? How they differ from each other. [12M]

(OR)

3. (a) Explain in detail Maslow's theory of needs hierarchy. [6M]
(b) What are the social responsibilities of management? Explain. [6M]

UNIT-II

4. Discuss in-detail the different types of Public Enterprises in business and explain their features, merits and demerits? [12M]

(OR)

5. A petroleum industry is evaluating two projects for investments and whose each cash flows are as follows [12M]

	Expected Cash Flows in INR	
YEAR	PROJECT- X	PROJECT- Y
0	(1200)	(1200)
1	600	150
2	450	300
3	350	250
4	200	700

Compute Payback Period and NPV for both projects and the discount factor of NPV is 10 %.

UNIT-III

- 6 (a) Explain the nature and scope of Managerial Economics? How Managerial Economics is based on demand in the market. [6M]
(b) How to measure the significance of Elasticity of Demand? Explain. [6M]
(OR)
7 Discuss in-detail the judgmental approach to Demand Forecasting. [12M]

UNIT-IV

- 8 (a) Explain in detail the Least Cost combination of inputs. [6M]
(b) Explain the following [6M]
i) Out of Pocket Costs ii) Imputed Costs
(OR)
9 (a) Distinguish between the internal and external economics of scale. [6M]
(b) Explain production function with Least Cost combination of inputs? [6M]

UNIT-V

- 10 What are the different types of Competition? Also highlight the features of Perfect Competition. [12M]
(OR)
11 Explain price output determination in case of Perfect Competition and Monopoly? [12M]

RA / AR16

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SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

III B.Tech I Semester Regular Examinations, October, 2018

MATRICES AND APPLICATIONS

(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) Reduce the matrix $A = \begin{bmatrix} 1 & 2 & -2 & 3 \\ 2 & 5 & -4 & 6 \\ -1 & -3 & 2 & -2 \\ 2 & 4 & -1 & 6 \end{bmatrix}$ into Echelon form and 7M
determine its rank.
- b) Determine for what values of **a, b** the simultaneous equations 7M
 $x+y+z=6$, $x+2y+3z=10$, $x+2y+az=b$ have a unique solution

(OR)

2. Determine P and Q such that the normal form of matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ 14M
is PAQ. Hence determine the rank of A.

UNIT-II

3. Determine the Eigen values and the corresponding Eigen vectors of the 14M
matrix

$$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

(OR)

4. Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & -2 \\ 2 & -2 & 1 \end{bmatrix}$ and 14M
determine A^{-1} and A^4

UNIT-III

5. Use LU decomposition to solve the system of equations 14M
 $2x+3y+z=9$, $x+2y+3z=6$, $3x+y+2z=8$

(OR)

6. Solve the system of equations $x + 2y + 3z = 1$; $2x + 3y + 8z = 2$; $x + y + z = 3$ by using matrix inversion method. 14M

UNIT-IV

7. Determine rank, index, signature and nature. the quadratic form $6x^2 + 3y^2 + 3z^2 - 4xy + 4xz - 2yz$ and reduce its canonical form . 14M
- (OR)
8. Reduce the quadric form to the canonical form by an orthogonal reduction $3x^2 + 2y^2 + 3z^2 - 2xy - 2yz$ 14M

UNIT-V

9. Write the matlab code to solve the linear system of equation $a_{11}x + a_{12}y + a_{13}z = b_1$; $a_{21}x + a_{22}y + a_{23}z = b_2$; $a_{31}x + a_{32}y + a_{33}z = b_3$, by using Gauss elimination method. 14M
- (OR)
10. Write the matlab code to find the eigen values and the corresponding eigen vectors of $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$. 14M