AR18

CODE: 18CET311   SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, March,2021

GEOTECHNICAL ENGINEERING-I
(Civil Engineering)

Time: 3 Hours   **Max Marks: 60**

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 water content, void ratio, porosity and degree of saturation.   8M
   b) Derive the relationship between porosity and void ratio.   4M

(OR)

2. a) Explain Indian Standard soil classification system for classifying coarse grained soil.   6M
   b) A soil mass in its natural state is partially saturated having a water content of 17.5% and void ratio of 0.87. Determine the degree of saturation, total unit weight, dry unit weight what is the weight of water required to make a mass of 10 m^3 volume to get saturated assume G = 2.69.   6M

UNIT-II

3. a) The falling head permeability test was conducted on a soil sample of 4cm diameter and 18cm length. The head fell from 1.0m to 0.40m in 20 minutes. If the cross-sectional area of the stand pipe was 1cm^2, determine the coefficient of permeability.   6M
   b) Explain about various factors affecting Co-efficient of permeability.   6M

(OR)

4. a) Explain in detail with neat sketches, the laboratory determination of permeability.   6M
   b) Explain briefly about the applications of flow net.   6M

UNIT-III

5. a) A concentrated load 85kN acts on the surface of a soil mass. Using Boussinesq analysis find the vertical stress at points (a) 6.6m below the surface on the axis of loading and (b) at radial distance of 3m from axis of loading but at same depth.   6M
   b) Discuss in detail about the Westergard's analysis to find vertical stress and horizontal shear stress for point load.   6M

(OR)

6. a) Find intensity of vertical pressure at a point 3 m directly below 25 kN point load acting on a horizontal ground surface. What will be the vertical pressure at a point 2m horizontally away from the axis of loading and at same depth of 3m? Use Boussinesq's equation. **6M**

   b) A saturated sand layer over a clay stratum is 5 m in depth. The water is 1.5 m below ground level as shown in the below figure. If the bulk density of saturated sand is 17.66 kN/m^3, calculate the effective and neutral pressure on the top of the clay layer. **6M**
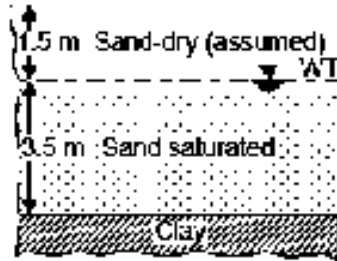
UNIT-IV

7. a) A cohesive soil yields a maximum dry density of 1.8 gm/cc at OMC of 16% during a Standard Proctor test. If the value of G is 2.65.What is degree of saturation, void ratio and air content? **6M**

   b) Describe Terzaghi's theory of one dimensional consolidation. **6M**

(OR)

8. a) Summarize the factors affecting compaction. **6M**

   b) What is permeability? List the factors affecting permeability? **6M**

UNIT-V

9. a) Explain the triaxial shear tests based on drainage and their applicability. **3M**

   b) A vane, 10.8 cm long, 7.2 cm in diameter, was pressed into a soft clay at the bottom of a bore hole. Torque was applied and the value at failure was 45 Nm. Find the shear strength of the clay on a horizontal plane. **9M**

(OR)

10. a) Two identical soil specimens were tested in a triaxial apparatus. First specimen failed at a deviator stress of 770kN/m^2 when the cell pressure was 2000kN/m^2. Second specimen failed at a deviator stress of 1370 kN/m^2 under a cell pressure of 400 kN/m^2. Determine the value of c and Φ analytically. If the same soil is tested in a direct shear apparatus with a normal stress of 600kN/m^2, estimate the shear stress at failure. **6M**

    b) Draw the Mohr-Coulomb failure envelopes of CU, CD and UU tests sandy soils and comment on shear strength parameters. **6M**

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UNIT-I

1. a) What are the various addressing modes in 8086? Explain with examples 6M
   b) The content of different registers are given below. Calculate the effective addresses for immediate, direct, register indirect, register relative, base index, and relative base index modes. 6M
   Offset [Displacement] = 5000H
   [ax] = 1000H, [bx] = 2000H, [si] = 3000H, [di] = 4000H, [bp] = 5000H,
   [sp]=6000H, [cs] = 0000H, [ds] = 1000H, [ss] = 2000H, [ip] = 7000H

(OR)

2. a) Explain the read and write cycle diagrams in 8086. 6M
   b) Explain the interrupt response sequence of 8086. 6M

UNIT-II

3. a) Develop an Assembly language program for addition of two numbers 6M
   b) Develop the assembly language programme for the expression [x1+y1] [x2+y2] where x1 = 2BH, x2 = 13H y1 = 06H, y207H. 6M

(OR)

4. a) Write an ALP to arrange given hexadecimal numbers in ascending order. 6M
   b) What are assembler directives? Explain with suitable examples. 6M

UNIT-III

5. a) Explain the control word format of 8255 in I/O and BSR mode 6M
   b) Draw and discuss Architecture of 8257 DMA Controller 6M

(OR)

6. a) Determine the mode set control word to initialise an 8255A as follows - Port A Handshake input ; Port B Handshake output; Port C bits PC6 and PC7 as outputs. 6M
   b) Draw and discuss Architecture of 8251 USART. 6M

UNIT-IV

7. a) Explain architecture of 80386. 6M
   b) Explain the Addressing modes of 80386. 6M

(OR)

8. a) Explain register organisation of ARM processor 6M
   b) Explain the protected mode of 80386. 6M

UNIT-V

9. a) Explain the functions of ports in 8051 microcontroller 6M
   b) Explain memory organisation of 8051 microcontroller 6M

(OR)

10. a) Draw and discuss the architecture of 8051. 6M
    b) Write an ALP to find sum and difference of two 8 bit numbers using 8051 6M

AR18

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular Examinations, March,2021
DESIGN OF MACHINE MEMBERS – I
(Mechanical Engineering)

**Time: 3 Hours**   **Max Marks: 60**

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) Discuss mohr's circle method to determine principal   4M
   stresses in detail
   b) The shaft of an over hang subjected to a force of 1kN   8M
   as shown in figure. The shaft is made of plain carbon
   steel 45 C8 (Yield strength $=380N/mm^2$) The factor of
   safety is 2. Determine the diameter of the shaft using
   maximum shear stress theory.
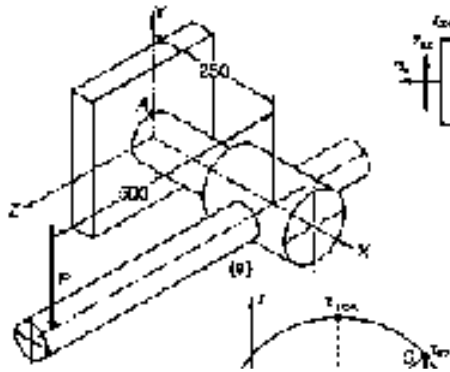
(OR)

2.   The load on a bolt consists of an axial pull of 10 kN   12M
       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;   3. Maximum principal strain theory;

UNIT-II

3. For supporting the travelling crane in a workshop, the brackets are fixed on steel columns as shown in Fig. The maximum load that comes on the bracket is 25 kN acting vertically at a distance of 500 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 35 MPa. Also find the cross-section of the arm of the bracket which is rectangular. **12M**
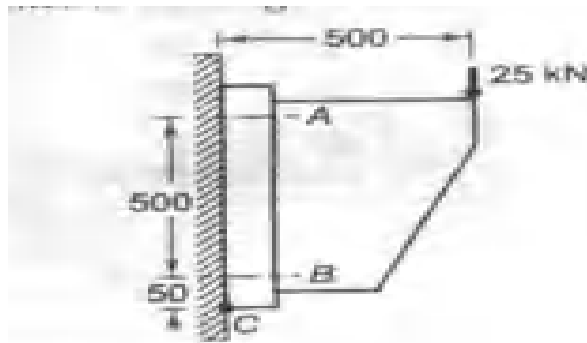
(OR)

4. a) Define notch sensitivity factor and explain its significance **4M**

   b) A component machined from a plate made of steel 45C8(Sut=630N/mm2) is shown in figure. It is subjected to a completely reversed axial force of 50kN. The expected reliability is 90% and factor of safety is 2. The size factor is 0.85. Determine the plate thickness t for infinite life. Take notch sensitivity factor is 0.8 **8M**
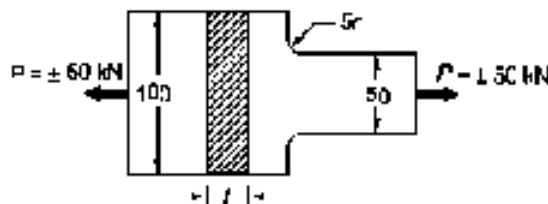
UNIT-III

5. a) Discuss types of failure in riveted joints. Explain caulking and fullering   6M

   b) Explain possible failures of a reverted joint and derive strength equation of riveted joints.   6M

(OR)

6. a) A bracket is welded to the vertical plate by means of two fillet welds as shown in figure. Determine the size of the welds if the permissible shear stress is limited to $70N/mm^2$ 6M
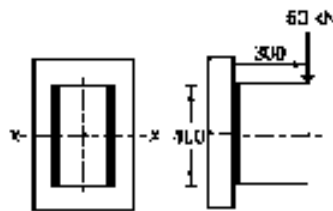
   b) Derive expression for maximum shear stress for transverse fillet weld.   6M

UNIT-IV

7. A solid shaft of diameter d is used in power transmission. It is required to replace the solid shaft by a hollow shaft of the same material and equally strong in torsion. Further the weight of hollow shaft per metre length should be half of the solid shaft. Determine the outer diameter of hollow shaft in terms of d   12M

(OR)

8. Design a muff coupling to connect two steel shafts transmitting 25kW power at 360 rpm. The shafts and key are made of plain carbon steel 30C8 ($S_{yt}= S_{yc}= 400N/mm^2$). The sleeve is made of grey cast iron FG 200. The factor of safety for the shafts and key is 4. For the sleeve factor of safety is 6 based on ultimate stremgth.   12M

9. Design a socket and spigot type cotter joint to connect two steel rods of equal diameter. Each rod is subjected to an axial tensil force of 50kN. Design the joint and specify its main dimensions.   12M

(OR)

10. a) Explain nipping of leaf spring   4M

    b) A semi elliptic multi leaf spring is used for the suspension of the rear axle of a track. It consists of two extra full length leaves and ten graduated length leaves including the master leaf. The center to center distance between the spring eyes is 1.2m . The leaves are made of steel (Syt=1500N/mm2 and E=207000N/mm2) and factor of safety is 2.5 . The spring is to be designed for a maximum force of 30kN.The leaves are pre stressed so as to equalize stresses in all leaves determine cross section in all leaves and deflection at the end of spring.   8M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

III B.Tech I Semester Regular Examinations, March,2021

CONTROL SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours   **Max Marks: 60**

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) Determine the transfer function $E_o(s)$ to $E_i(s)$ for the network   8M
        shown in Figure.
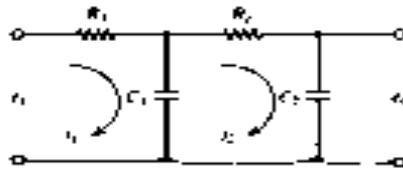
    b) Explain the necessity and effect of feedback in control   4M
        systems.

(OR)

2. a) Find the transfer function of the system using block diagram   7M
        reduction technique
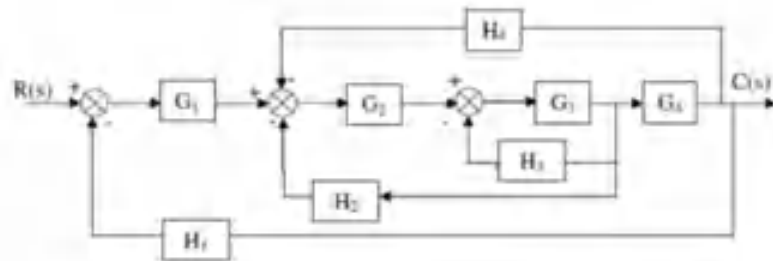
    b) State and Explain Mason's gain formula in detail.   5M

UNIT-II

3. a) Obtain the transfer function of field controlled DC servo   6M
        motor.

    b) Find all the time domain specifications for a unity feedback   6M
        control system whose open loop transfer function is given by

$$G(s) = \frac{25}{S(S+6)}$$

(OR)

4.   Derive expression for c(t) for second order underdamped   12M
system when input is unit step.

UNIT-III

5. a) Define stability and explain various types of stability.   4M
   b) Construct Routh array and determine the stability of the   8M
   system represented by the characteristics equation
   $S^5+S^4+2S^3+2S^2+3S+5=0$.

(OR)

6.   Draw root locus for unity feedback system with open loop TF   12M
   $G(S)= \dfrac{k}{S(S+1)(S+3)}$

UNIT-IV

7.   Draw the bode plot for the open loop transfer function G(S)   12M
   =100/{s(s+1)(s+2)} Determine the Phase Margin & Gain
   Margin.

(OR)

8. a) Explain the frequency domain specifications of second order   6M
   systems
   b) Sketch Polar plot for unity feedback system with OLTF G(S)   6M
   $= \dfrac{1}{(s+4)\,(s+2)}$

UNIT-V

9. a) What do you mean by compensation? Explain lag and lead   8M
   compensators.
   b) Define state variable and give the advantages of state space   4M
   analysis.

(OR)

10. a) Determine the transfer function of the system having the   6M
    state equation $\dot{X} = AX + BU$ & Y =CX+DU, where
    $A = \begin{bmatrix} 1 & 0 \\ -2 & -3 \end{bmatrix}$ $B = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$ C = [1   2]   D = 0
    b) Obtain the state model of the system whose transfer function   6M
    is given as
    $$\frac{y(s)}{u(s)} = \frac{10}{(s^3 + 4s^2 + 2s + 1)}$$

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UNIT-I

1. a) Design DFA accepting odd number of 0's and odd number of 1's over the alphabet {0,1}   6M

   b) Design equivalent DFA for the given NFA where q0 is the initial state and q3 is a final state   6M

	a	b	c
q0	{q1}	Φ	Φ
q1	{q0}	{q3}	{q2}
q2	Φ	Φ	{q1}
q3	Φ	{q1}	Φ

(OR)

2. a) Construct NFA for the following NFA with ε-moves, where q1 is an initial and the final state.   6M

	a	b	ε
► *q1	Φ	Φ	{q2}
q2	{q3}	{q4}	Φ
q3	Φ	{q2}	Φ
q4	Φ	Φ	{q1}

   b) Minimize the following DFA   6M
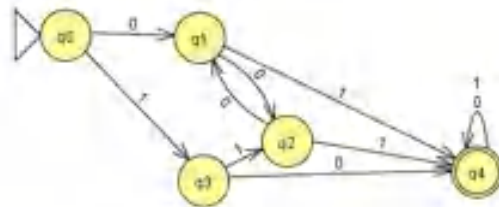
UNIT-II

3. a) Derive Regular-Expression for the following Finite Automaton   6M
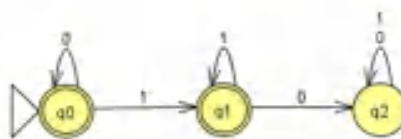
b) Write Regular Expression for the following Languages.   6M
      i. L= {Set of strings of 0's and 1's ends with '01'}.
      ii. L = {Set of strings of a's and b's begins with 'ab' or 'ba'}
      iii. L = {Set of strings 0's and 1's containing substring '000'}

(OR)

4. a) Convert the regular expression $r=(11+0)^*(00+1)^*$ to ε-NFA.   6M
   b) Prove that the language $L=\{a^n b^{2n}/n>=1\}$ is not regular using pumping lemma on regular sets.   6M

UNIT-III

5. a) Show leftmost derivation and rightmost derivation for the strings 'abbbaaba' & 'abababba' along with Derivation Trees from the following grammar S->aSbS / bSaS / ϵ 6M
   b) Determine the RLG for the following Finite Automaton   6M

(OR)

6. a) Convert the following CFG in Greiback Normal Form (GNF)   6M
   S->AA/a
   A->SS/b
   b) Find an equivalent grammar in to CNF for the following CFG   6M
   S $\rightarrow$ ABCD,   A $\rightarrow$ Aa/b,   B $\rightarrow$ Bb/b,   C $\rightarrow$ Cc/c ,   D $\rightarrow$ Dd/d

UNIT-IV

7. a) Construct PDA for language $L=\{wcw^R | w\in \{0,1\}^*\}$ 6M

   b) For the PDA M =$(\{q0,q1\},\{0,1\},\{0,1,z0\},\delta,q0,Z0,\Phi)$ where δ is given by   6M
   $\delta(q0,\varepsilon,Z0)=\{(q1,\varepsilon)\}$, $\delta(q0,0,Z0)=\{(q0,0Z0)\}$, $\delta(q0,0,0)=\{(q0,00)\}$,
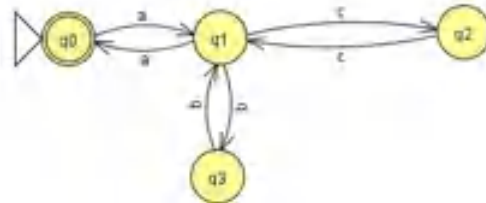 $\delta(q0,1,0)=\{(q0,10)\}$, $\delta(q0,1,1)=\{(q0,11)\}$, $\delta(q0,0,1)=\{(q1,\varepsilon)\}$,
   $\delta(q1,0,1)=\{(q1,\varepsilon)\}$, $\delta(q1,0,0)=\{(q1,\varepsilon)\}$, $\delta(q1,\varepsilon,Z0)=\{(q1,\varepsilon)\}$
   Obtain the CFG generating the language accepted by M. This PDA accepts
   $L=\{1^n 0^{m+n}/m,n>=0\}$

(OR)

8. a) Construct PDA equivalent to the following grammar S$\rightarrow$aAA, A$\rightarrow$aS/bS/a   6M
   b) Construct a PDA to the following CFG   6M
   S$\rightarrow$0BB; B$\rightarrow$0S/1S/0

UNIT-V

9. a) Define Turing Machine and Construct a TM accepting the language   6M
   $L=\{a^n b^{m+n} c^m/m,n>=1\}$
   b) Explain techniques for construction of Turing Machine.   6M

(OR)

10. a) i)Explain Chomsky hierarchy of languages   6M
    ii) Design a TM to perform addition of two unary numbers
    b) Find whether the lists M = (abb, aa, aaa) and N = (bba, aaa, aa) have a Post Correspondence Solution?   6M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular & Supplementary Examinations, March-2021
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) Define void ratio, water content, degree of Saturation and specific gravity of soil solids.   7M

    b) A partially saturated sample from a borrow pit has a natural moisture content of 15% and bulk unit weight of 1.90g/cc. The specific gravity of solids is 2.70. Determine the degree of saturation and void ratio. What will be the saturated unit weight of the sample?   7M

(OR)

2. a) Explain in detail I.S. classification of soils.   8M

    b) How soil forms? explain in detail.   6M

UNIT-II

3. a) Derive the equation to find coefficient of permeability using variable head method.   7M

    b) Discuss the factors affecting permeability of soil in detail.   7M

(OR)

4. a) One cubic metre of wet soil weighs 19.80 kN. If the specific gravity of soil particles is 2.70 and water content is 11%, find the void ratio, dry density and degree of saturation. For a falling-head permeability test, the following values are given: 8M

    - Length of specimen 200 mm.
    - Area of soil specimen 1000 mm2.
    - Area of standpipe 40 mm2.
    - Head difference at time t = 0 = 500 mm.
    - Head difference at time t = 180 sec = 300 mm.

    Determine the hydraulic conductivity of the soil in cm/sec.

    b) Write a note on flow net and quick sand condition.   6M

5. a) A concentrated load of 2000kN is applied at the ground surface. 6M
Determine the vertical stress at a point P which is 6m directly below
the load. Also calculate the vertical stress at a point R which is at a
depth of 6m but at a horizontal distance of 5m from the axis of the
load. Use Westergaard's equation.

   b) Discuss Newmark's influence chart and its uses. 8M

(OR)

6. a) Differentiate between Westergaard's theory and Boussinesq's 6M
theory.

   b) A concentrated load of 22.5 KN acts on the surface of a 8M
homogeneous soil mass of large extent. Find the stress intensity at a
depth of 15m (i) directly under the load (ii) at a horizontal distance
of 7.5m. Use Boussinesq's equation.

UNIT-IV

7. a) Explain the spring analogy for primary consolidation ? 7M
   b) Define the terms 'Compression index', coefficient of consolidation', 7M
and 'coefficient of compressibility', and indicate their units and
symbols.

(OR)

8. a) Explain in detail the factors affecting compaction. 6M
   b) In a standard Proctor test, 1.8kg of moist soil was filling the mould 8M
(volume=944cc) after compaction. A soil sample weighing 23g was
taken from the mould and oven dried for 24 hours at a temperature
of 110^oC. Weight of the dry sample was found to be 20g. Specific
gravity of soil solids is 2.7. Determine the theoretical maximum
value of the dry unit weight of the soil at that water content.

UNIT-V

9. a) Describe the Direct shear test in detail 8M
   b) Two identical specimens of a soil were tested in a triaxial 6M
apparatus. First specimen failed at a deviator stress of 770 kN/m^2,
when the cell pressure was 200 kN/m^2, while the second specimen
failed at a deviator stress of 1370 kN/m^2 under a cell pressure of
400 kN/m^2. Determine c and φ.

(OR)

10. a) Discuss different types of laboratory tests to determine shear 7M
strength of a soil.
    b) In an in-situ Vane shear test on a saturated clay , a torque of 35Nm 7M
was required to shear the soil. The diameter of the vane was 50mm
and length 100mm. Calculate the undrained shear strength of the
clay.

AR16

CODE: 16EC3015   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular & Supplementary Examinations, March-2021
FUNDAMENTALS OF SIGNALS AND SYSTEMS
(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) Prove exponential signal is non-periodic   4M
   b) Write the basic operations performed on signals   10M

(OR)

2. a) Explain how the time shifting, time scaling, signal addition operations, performed on signals with one example.   7M
   b) Explain the following singularity functions.   7M
      i) Unit step ii) Unit impulse   iii) Unit ramp functions

UNIT-II

3. a) What is convolution, State the properties of Convolution   7M
   b) Obtain convolution of the two continuous time functions as :   7M
   $x(t) = e^{t^2}$ and $h(t) = 3t^2$ for all values of t

(OR)

4. a) What is meant by stability in linear Time invariant systems   **7M**
   b) Check the system $y(t) = 5\sin x(t)$ for linearity   7M

UNIT-III

5. Obtain the Fourier transform of Rectangular pulse shown below, and draw its amplitude spectrum   14M

$$x(t) = \begin{cases} 1 & for\, 0 < t < T \\ 0 & otherwise \end{cases}$$

(OR)

6. What is Fourier Transform and State its properties   14M

UNIT-IV

7.   Define Laplace Transform, and explain its properties   14M

(OR)

8. a) Using convolution integral determine $L^{-1}\left[\dfrac{1}{s^2(s+2)}\right]$ 7M

   b) Solve the following differential equation $\dfrac{d^3y}{dt^3}+4\dfrac{dy}{dt}+5y(t)=5x(t)$ 7M

   with $y(0^-)=1$ and $\left.\dfrac{dy}{dt}\right|_{0^-}=2$

   and input $x(t)=u(t)$

UNIT-V

9.   Define z transform, what are its characteristics. Mention and prove   14M
      any four properties of z transform.

(OR)

10   Determine all possible sequences of x(n) associated with Z-transform   14M

   $X(z)=\dfrac{5z^{-1}}{(1-2z^{-1})(3-z^{-1})}$

AR16

CODE: 16ME3013   SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, March-2021
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
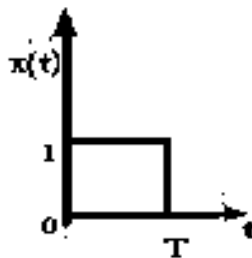
UNIT-I

1. a) What are the design considerations of machined parts ?   6
   b) The load on a bolt consists of an axial pull of 10 kN together with a transverse shear force   8
      of 5 kN Find the diameter of bolt required according to 1. Maximum principal stress theory;
      2. Maximum shear stress theory;

(OR)

2. a) What is fatigue life and endurance limit explain with S- N curve   6
   b) A bar of steel has an ultimate tensile strength of 700 Mpa, a yield stress of 400 Mpa and
      fully corrected endurance limit of 220 Mpa. The bar is subjected to a mean bending stress
      of 60 Mpa and stress amplitude of 80Mpa. Superimposed on it is a mean torsional stress   8
      and torsional stress amplitude of 70 and 35 Mpa respectively. Find the factor of safety.

UNIT-II

3. a) How will you designate ISO metric coarse threads and fine threads?   4

   b) A cantilever bracket is bolted to a column using three M15×1.75 bolts P, Q and R. The   10
      value of maximum shear stress developed in the bolt P ,Q and R (in MPa) is

(OR)

4. a) What are the advantages and disadvantages of power screw ?   4
   b) A double- threaded power screw is used to raise a load of 5 KN. The nominal diameter is
      60 mm and the pitch is 9 mm . The threads are Acme type ($2\theta = 29^0$) and the coefficient of
      friction at the screw threads is 0.15 Neglecting collar friction calculate i) Torque required to   10
      raise the load ii) Torque required to lower the load iii) Efficiency of screw for lifting the
      load.

UNIT-III

5. a) Write the possible failures of a riveted joint.   4
   b) A steel plate is subjected to a force of 5KN and fixed to channel by means of three identical
      bolts as shown figure. The bolts are made of plain carbon steel 45C8 ($\sigma yt=380$ N/mm^2) and
      the factor of safety is 3. Specify the size of the bolts.   10
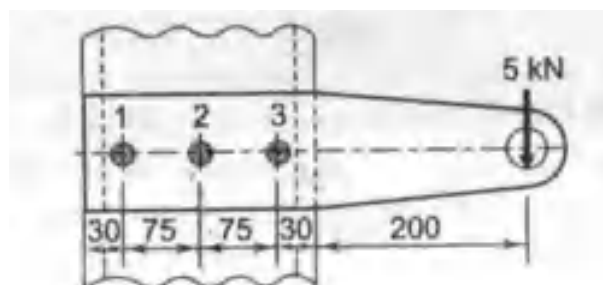
(OR)

6. a) Write the advantages of welded joints compared with the riveted joints   4

    b) A beam of rectangular cross section is welded to a support by means of fillet welds as shown in fig. Determine the size of the weld, if the permissible shear stress is limited to 75 MPa. Also identify maximum load that can be applied, if the size of the weld is 10mm.   10
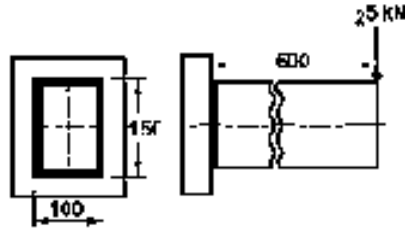

UNIT-IV

7. Determine the diameter of the hollow shaft having inside diameter 0.5 times the outside diameter. The permissible shear stress is limited to 250 N/mm^2. The shaft carries a 800 mm diameter cast iron pulley. This pulley is driven by another pulley mounted on the shaft placed below it. The belt ends are parallel and vertical. The ratio of tensions in the belt is 3. The pulley on the hollow shaft weighs 900 N and overhangs the nearest bearing by 250 mm. The pulley is to transmit 35 kW power at 500 rpm.   14

(OR)

8. Design and draw a protected type of C I flange coupling for a steel shaft transmitting 15 k W at 200 rpm and having an allowable shear stress of 40 MPa. The working stress in bolts should not exceed 30 MPa. Assuming that the same material is used for the shaft and key and that the crushing stress is twice the value of its shear stress and the maximum torque is 25% greater than the full load torque. Take shear stress for C I as 4 MPa.   14

UNIT-V

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

(OR)

10. A semi elliptical laminated spring 950mm long and 60mm wide is held together at the centre by a band 55mm wide. If the thickness of each leaf is 6mm, find the number of leaves required to carry a load of 4300N. Assume a maximum working stress of 480Mpa. If two of these two leave extended the full length of the spring, find deflection of the spring. The Young's modulus for the spring material may be taken as 210KN/mm^2.   14

AR16

CODE: 16EC3017   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular / Supplementary Examinations, March-2021
DIGITAL IC APPLICATIONS
(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) Design a 2-input NAND gate using CMOS logic and verify its functionality.   7M
    b) Design XOR gate using CMOS technology.   7M
    (OR)
2. a) List out the differences between the following logic families: 7M
        (i) CMOS , (ii) ECL, (iii) TTL
    b) Explain about CMOS/TTL interfacing.   7M

UNIT-II

3. a) Design 8-bit priority encoder using 74x148 IC and explain its operation.   7M
    b) Design 16x1 multiplexer using two 74x151 multiplexer and one 74x139 decoder   7M
    (OR)
4. a) What are the different types of objects in VHDL? Explain   7M
    b) Write a VHDL code for 3x8 decoder using data flow modeling.   7M

UNIT-III

5. a) Design a 4-bit binary adder using 74 x 283 IC and verify its functionality.   7M
    b) Explain the operation of dual priority encoder and also give the pin description for 7M
       the same?
    (OR)
6. a) Write a VHDL code for half adder and full adder using data flow modelling.   7M
    b) What is a barrel shifter? Design a 16-bit barrel shifter using 74 x 151 IC.   7M

UNIT-IV

7. a) Draw and explain the following flip-flops   7M
        (i) D-FLIP FLOP (ii) JK-FLIP FLOP
    b) Design 4-bit ripple binary counter using JK-flip-flop with edge triggering.   7M
    (OR)
8. a) What is shift register? And design 4 bit shift right register.   7M
    b) Write a VHDL code for 8-bit shift left and shift right register.   7M

UNIT-V

9. a) Implement the Boolean functions $F_1 = ABC' + A'BC$ and $F_2 = A'B' + ABC$ using   7M
       PAL.
    b) Compare all simple programmable logic devices.   7M
    (OR)
10. a) Draw and explain the structure and configuration of SPLD and CPLD?   7M
    b) Implement the following Boolean function using PLA: 7M
       F1 = AB'+AC+A'BC'
       F2 = (AC+BC)'

AR16

CODE: 16CS3011   SET-1

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Regular & Supplementary Examinations, March-2021

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 permissions in Unix with examples.   7
   b) Discuss the following commands with syntax   7
      (i) mv   (ii) cp   (iii) du   (iv) awk   v)ln
                                   (OR)
2. a) Explain the modes of operation in vi editor with examples   7
   b) Discuss about disk utilities with examples.   7

UNIT-II

3. a) What is a Shell ?and give various types of shells with examples?   7
   b) Write a shell program to find the factorial of given number.   7
                                   (OR)
4. Discuss about pipe command, input redirection, output redirection, error   14
   redirection

UNIT-III

5. Explain the following system calls   14
      i) umask ii) lseek iii) close iv) create vi) stat vii) dup
                                   (OR)
6. a) Differentiate between System calls and Library functions.   7
   b) Discuss about file and directory maintenance system calls   7

UNIT-IV

7. a) What is process? Explain the hierarchy of Unix processes.   7
   b) Explain the Mechanism of Process creation in Unix?   7

                                   (OR)
8. Explain the following functions   14
   a) kill b) raise c) alarm d) pause e)abort f) system g)sleep.

UNIT-V

9. Briefly explain about IPC mechanisms   14
                                   (OR)
10. a) What is a message queues? How it is used for interposes communication 7
    b) Differentiate between named pipe & name less pipes   7

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AR13

Time: 3 Hours   Max Marks: 70

PART-A

ANSWER ALL QUESTIONS   [1 x 10 = 10 M]

1. a) Draw three phase diagram of soil
   b) Express the equation of permeability by constant head method.
   c) Express the Boussines equation for point load.
   d) Define zero air voids line.
   e) Define void ratio.
   f) Uniformity coefficient.
   g) Darcy's law
   h) Express the Wester gaard's equation for point load.
   i) Define coefficient of compressibility
   j) Express the coulomb's equation for shear strength.

PART-B

Answer one question from each unit   [5x12=60M]

UNIT-I

2. **a** How soil forms? explain in detail   **6M**
   b What are the agents responsible for weathering of rocks?   **6M**

(OR)

3. There are two borrow areas A and B which have soils with void ratios of 0.80 and **12M**
0.70, respectively. The inplace water content is 20%, and 15%, respectively. The
fill at the end of construction will have a total volume of 10,000 m^3, bulk density of
2Mg/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 100m^3 for area B, which of the borrow area is more
economical?

UNIT-II

4. **a** One cubic metre of wet soil weighs 19.80 kN. If the specific gravity of soil **6M**
particles is 2.70 and water content is 11%, find the void ratio, dry density and
degree of saturation. For a falling-head permeability test, the following values are
given:

   • Length of specimen 200 mm.
   • Area of soil specimen 1000 mm2.
   • Area of standpipe 40 mm2.
   • Head difference at time t = 0 = 500 mm.
   • Head difference at time t = 180 sec = 300 mm.
   Determine the hydraulic conductivity of the soil in cm/sec.

   b Explain the uses of flow net   **6M**

(OR)

5. a A soil profile consists of a surface layer of sand 3.5 m thick (ρ = 1.65 Mg/m^3), an intermediate layer of clay 3 m thick (ρ = 1.95 Mg/m^3) and the bottom layer of gravel 3.5 m thick (ρ = 1.925 Mg/m^3). The water table is at the upper surface of the clay layer. Determine the effective pressure at various levels immediately after placement of a surcharge load of 58.86 kN/m^2 to the ground surface.   **6M**

b Derive the expression for critical hydraulic gradient.   **6M**

UNIT-III

6. Calculate the vertical stress at a point P at a depth of 2.5 m directly under the 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.   **12 M**

(OR)

7. A concentrated load of 22.5 kN acts on the surface of a homogeneous soil massof large extent. Find the stress intensity at a depth of 15 meters and (i) directly under the load, and (ii) at ahorizontal distance of 7.5 metres. Use Boussinesq's equations. Compare the value with the result from Westergaard's theory.   **12M**

UNIT-IV

8. The following results were obtained from a standard compaction test on a sample of soil.   **12M**

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).

(OR)

9. a Describe briefly the procedure to compute the pre-consolidation pressure.   **6 M**

b Explain the consolidation process with spring analogy mechanism.   **6 M**

UNIT-V

10. Differentiate between unconsolidated undrained test and a drained test. Under what conditions are these test results used for design purposes?   **12M**

(OR)

11. Describe the Direct shear test. What are the advantages of direct shear test   **12M**

AR13

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
III B.Tech I Semester Supplementary Examinations, March-2021

SIGNALS AND SYSTEMS
(Electrical and Electronics Engineering)

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

PART-A

ANSWER ALL QUESTIONS   **[1 x 10 = 10 M]**

1. a) Define System
   b) Define causality of a System
   c) Define exponential Fourier series
   d) Define Cosine series
   e) What are Dirichlet conditions
   f) Find Fourier transform of $\delta(t+6)$
   g) Define ROC
   h) What is the Laplace transform of $\sin(t)u(t)$
   i) Define Scaling property of Z transform
   j) What is Z transform of $u(n)$

PART-B

Answer one question from each unit   **[5x12=60M]**

UNIT-I

2. a) Explain how the time shifting, time scaling, signal addition operations,   6
      performed on signals with one example.
   b) Explain the following singularity functions.   6
      i)   Unit step ii) Unit impulse   iii) Unit ramp functions
                              (OR)
3. a) Explain about stability and causality of LTI system   6
   b) Check whether the following systems are Linear, Causal and Time   6
      Invariant
      i)$y(t) = e^{x(t-4)}$ ii)$y(t) = \log x(t)$

1 of 2

UNIT-II

4. a) Find the trigonometric Fourier series of the signal shown below   6
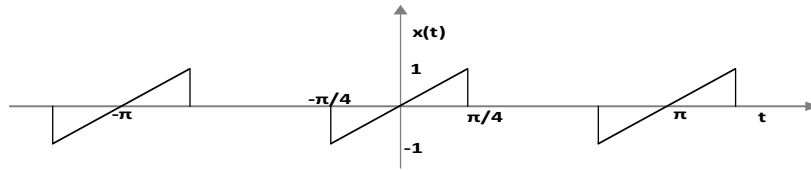
   b) Derive cosine series from exponential series   6

(OR)

5. a) A periodic signal is represented as $x(t) = 1 + 5cos(2w_0t) + 7sin\left(4w_0t + \frac{\pi}{4}\right)$, draw the frequency spectrum   6

   b) State and prove convolution property of the Fourier series.   6

UNIT-III

6. a) Find out the Fourier transform of x(t)=sinc(Πt)   6
   b) State and prove differentiation in time property of Fourier transform   6

(OR)

7. a) Write down any three properties of Fourier transform.   6
   b) Find the Fourier transform of   i) U(t)   ii) sgn (t)   6

UNIT-IV

8. a) Determine the Laplace transform of unit step, unit impulse and unit ramp signals.   6

   b) Use the convolution property of the Laplace transform to determine $y(t) = e^{at}u(t) \text{ x } e^{bt}u(t)$ 6

(OR)

9. a) Evaluate the Laplace transform and ROC of the function $x(t) = -e^{-at}u(t)$ 6

   b) Find out the inverse Laplace transform of $X(s) = \frac{e^{-2s}}{(s+1)(s+5)}$ 6

UNIT-V

10.   Define z transform, what are its characteristics. Mention and prove any four properties of z transform.   12

(OR)

11. a) Evaluate the z-Transform and ROC of $x(n) = a^n u(n)$ 6
   b) Find out the inverse Z- transform of $X(z) = \frac{z}{(z-5)^2(z-8)}$ 6