Hall Ticket Number :										

Code : 4GC31

R-14

II B.Tech. I Semester Supplementary Examinations May/June 2016

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 **Time: 03 Hours**

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) By reducing the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \\ 3 & 0 & 5 & -10 \end{bmatrix}$ in to normal form and find its rank.

   b) Using Cayley-Hamilton Theorm find A^4,where $A = \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$

OR

2. a) Find the values of a and b for which the equations x + y + z = 3, x +2y +2z = 6, x + ay +3z = b have **i)** no solution **ii)** a unique solution **iii)** infinite number of solutions.

   b) Eigen values & Eigen Vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

UNIT-II

3. a) Find the real root of the equation 2x – 3 sin x – 5 = 0, using Regula falsi Method.

   b) Find f(22) for the following data by Newton's forward Interpolation formula.

x	20	25	30	35	40	45
y	354	332	291	260	231	204

OR

4. a) Find the negative root of the equation $x^3 - 21x + 3500 = 0$ by Newton's Raphson method.

   b) Evaluate $\int_0^1 e^{-x}$ dx using Simpsons 1/3rd rule.

UNIT-III

5. a) Use Picard's method to approximate the value of y when $x = 0.4$, given that $\frac{dy}{dx} = x^2 + y^2, y(0) = 0$.

   b) Use Runge-Kutta method of 4th order to find y(0.2), given that $10\frac{dy}{dx} = x^2 + y^2, y(0) = 1$

OR

6. Find $y(0.2)$, $y(0.4)$, $y(0.6)$ using Runge- kutta 2nd order method and then find $y(0.8)$ by Milne's method if $\frac{dy}{dx} = 1 + y^2, y(0) = 0$.

UNIT-IV

7. a) Find the half-range sine series for $f(x) = x(\pi - x)$ in $0 < x < \pi$. Deduce that $\frac{1}{1^3} - \frac{1}{3^3} + \frac{1}{5^3} - \frac{1}{7^3} + \cdots = \frac{\pi^3}{32}$.

   b) Use the separation of variables technique to solve $3u_x + 2u_y = 0$ with $u(x,0) = 4e^{-x}$

OR

8. a) Given $f(x) = \begin{cases} -x + 1, -\pi \le x \le 0, \\ x + 1\ ,\ 0 \le x \le \pi. \end{cases}$ Is the function even or odd? Find the Fourier series for $f(x)$ and deduce the value of $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$

   b) Obtain the partial differential equation by eliminating the arbitrary functions from $z = yf(x) + xg(y)$.

UNIT-V

9. a) Find the regular function whose imaginary part is $\frac{x-y}{x^2+y^2}$

   b) Evaluate, using Cauchy's integral formula $\int_c \frac{\log z}{(z-1)^3} dz$, where c is $|z-1| = \frac{1}{2}$

OR

10. a) Find whether f(z) = $\frac{x-iy}{x^2+y^2}$ is analytic or not.

    b) Use Cauchy's integral formula to evaluate $\int_c \frac{e^{-z}}{(z+1)} dz$, where C is the circle $|z| = 2$.

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Hall Ticket Number :										

R-14

Code: 4G538

II B. Tech. I-Semester Supplementary Examinations May/June 2016

Electrical & Mechanical Technology

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

Use separate booklets for Part-A & Part-B

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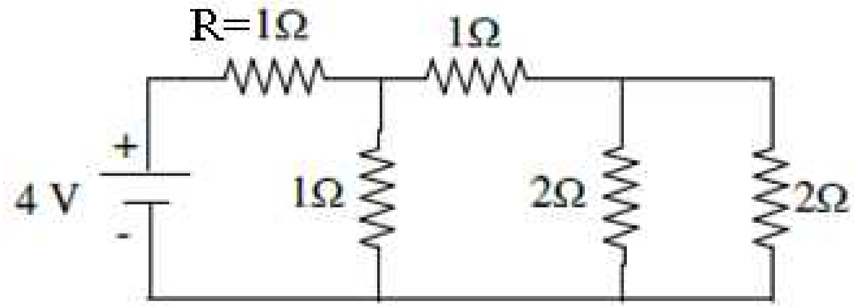
PART-A

UNIT-I

1. a) State and explain ohm' s law and its limitation

   b) Calculate power consumed by the resistor 'R' in the following circuit.



OR

2. a) Explain the Principle of Operation of DC motor.

   b) A lap wound DC generator having 80 slots with 10 conductors per slot generator at no load emf of 400v, when running at 1000 rpm. At what speed should it be rotated to generate a voltage of 220v on open circuit.

UNIT-II

3. a) Derive the expression for emf equation for 1-ø Transformer.

   b) A single phase transformer has 500 primary and 1000 secondary turn. The net cross sectional area of the core is 50cm^2. If the primary winding is connected to a 50 HZ supply at 400v. Calculate the peak value of the flux density in the core and voltage induced in the secondary winding.

OR

4. a) Discuss about regulation, losses and efficiency of a transformer.

   b) What is meant by 'slip' in an induction motor? Discuss about torque-slip characteristics of an induction motor.

UNIT-III

5. a) What is the purpose of a shielding gas in a TIG welding? Explicate the TIG welding process with the help of a neat sketch.
   b) Sketch and explain various types of flames used in oxy-acetylene welding process.

OR

6. a) Explain the principle of an arc welding. Give the list of equipment's required in general for electric arc welding.
   b) Describe MIG welding process stating its advantages and limitations.

UNIT-IV

7. a) Explain briefly various types of lubrication systems.
   b) Explain the principle of air compressor and discuss the working of a multi-stage reciprocating air compressor.

OR

8. a) Classify I.C. engines. Explain the working principle of a four stroke SI engine with a neat diagram.
   b) Explain the working principle of a single stage reciprocating air compressor.

UNIT-V

9. a) Define a refrigerant. Can water be used as a refrigerant? Justify.
   b) Discuss the importance of boiling and freezing point of R-11, R-12, R-22, R-717 and R-13 refrigerants with reference to their applications.

OR

10. a) Define air-conditioning. Explain room air-conditioning system with a neat sketch.
    b) Describe vapour absorption refrigeration system with a flow diagram. Also compare it with vapour compression refrigeration system.

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Hall Ticket Number :										

R-14

Code : 4G631

II B.Tech. I Semester Supplementary Examinations May/June 2016

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) A steel rod of 30mm diameter is enclosed by a copper tube of 50mm external diameter and 35mm internal diameter. The ends are closed by rigid metal plates. If the temperature of the assembly is raised by 60^0C, find the stresses in the steel and copper rods and the combined expansion of the assembly. Take $E_S = 2 \times 10^5$ N/ mm^2 and $E_C = 1 \times 10^5$ N/ mm^2; $\alpha_S = 1.2 \times 10^{-5}$ per ^{0}C and $\alpha_C = 1.6 \times 10^{-5}$ per ^{0}C 10M

   b) Explain

      i) normal stresses and

      ii) necessity of factor of safety 4M

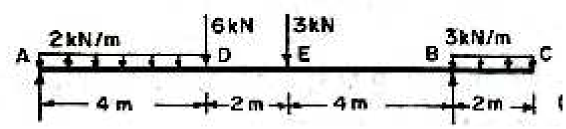
OR

2. a) Draw and explain stress strain diagram for mild steel and explain all salient points on it. Also sketch deviation of true stress- strain diagram from the engineering stress strain diagram 8M

   b) An unknown weight falls through a height of 15mm on collar rigidly attached to the lower end of a vertical bar 3m long and 800sq mm cross section. If the maximum instantaneous extension is known to be 2mm, what is the corresponding stress and magnitude of unknown weight? 6M

UNIT-II

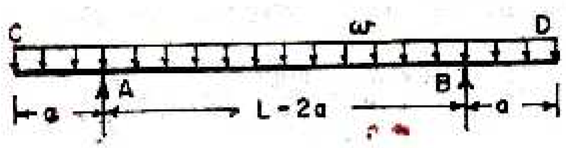
3. Draw shear force and bending moment diagram for the beam shown below. Mark all salient values on them. Comment on point of contra flexure.



14M

OR

4. Suggest the length of overhung ‘a’ on the beam shown below, such that the maximum bending moment to be a minimum



14M

UNIT-III

5. a) Prove that the centroidal axis of a symmetrical beam section coincides with its neutral axis. 4M

b) An I Section beam of identical flanges 100mm x 10mm connected by a web 200mm x 7.5mm, is simply supported over two supports 10m apart. Determine the single concentrated load, the beam can support at a distance of 3.5m form one of its supports, if the maximum bending stress in the beam material is limited to 80N/ mm^2. 10M

OR

6. a) Find the width and depth of the strongest beam that can be cut out of a cylindrical log of wood, whose diameter is D. 4M

b) Determine the maximum shear force a circular beam section of 250mm diameter can support, if the limiting shearing stress in the beam material is 60N/ mm^2. 10M

UNIT-IV

7. Determine the maximum deflection on a simply supported beam of 6m length supporting a trapezoidal load varying from 2kN/ m intensity to 8kN/m. Also find the end slopes. Take $E = 2 \times 10^5$ N/mm^2 and I = 2000cm^4. **Use Macaulay's method.** 14M

OR

8. A cantilever beam of 3m length supports uniformly distributed load of 6kN/m intensity on entire span. Assuming $E = 2 \times 10^5$ N/mm^2 and I = 1500cm^4, determine maximum deflection and end slope on the beam using **moment area method.** 14M

UNIT-V

9. A bolt is subjected to an axial pull of 12kN together with a transverse shear of 6kN. Determine the diameter of the bolt according to **i)** Maximum principal stress theory, **ii)** Maximum shear stress theory, **iii)** Maximum strain theory, **iv)** strain energy theory and **v)** Shear strain energy theory. Take elastic limit in tension = 300N/ mm^2, factor of safety = 3 and $\mu = 0.3$. 14M

OR

10. A rectangular block of a material is subjected to a tensile stress of 105N/ mm^2 on one plane and a tensile stress of 45N/ mm^2 on a plane right angle to the earlier, along with a shear stress of 65N/ mm^2 on all the planes. Determine **i)** the magnitude of principal stresses **ii)** the orientation of principal planes and **iii)** the maximum shear stress. **Use Graphical (Mohr's circle) method only.** 14M

Hall Ticket Number :										

R-14

Code : 4G632

II B.Tech. I Semester Supplementary Examinations May/June 2016

Surveying

(Civil Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) Discuss briefly the different types and sources of errors in surveying? 7M

   b) List out the classification's of survey? 7M

OR

2. a) Describe the various methods of chaining on a slope along with their advantages and disadvantages? 6M

   b) Write short notes on the following terms:
      i) Normal tension,
      ii) hypotenusal allowance,
      iii) cumulative error and
      iv) Ranging 8M

UNIT-II

3. a) Describe the collimation method of reducing the levels and Compare it with the rise and fall method? 6M

   b) Derive an expression for curvature correction and for combined curvature and refraction correction and Discuss briefly the effect of curvature and refraction in levelling. 8M

OR

4 a) Define a contour. State the various characteristics of contour lines. 6M

   b) State and derive the following:
      i) Trapezoidal rule
      ii) Simpson's rule 8M

UNIT-III

5. a) Sketch and state the direct relationship between fundamental lines of a theodolite. 5M

   b) Describe the temporary adjustments of a theodolite. Explain how would you measure the following with a theodolite:
      (i) Horizontal angle
      (ii) Vertical angle
      (iii) Bearing of a line 9M

OR

6. Two stations at elevation of α and β are sighted by a theodolite in which the line of collimation is inclined to the trunnion axis at an angle (90^o - e), where 'e' is small.
   (i) Derive an expression for the error in the horizontal angle between the two stations as given by the instrument.
   (ii) Show by a diagram the effect of the collimation error on the vertical circle reading of one station.
   (iii) What is the effect of measuring the horizontal and vertical angles on both faces? 14M

UNIT-IV

7. a) Briefly discuss the following:
   (i) Errors in tacheometry
   (ii) Accuracy of tacheometric observations 6M

   b) Explain the procedure to determine the tacheometric constants by
   (i) Fixed hair method
   (ii) Movable hair method 8M

OR

8. a) State the advantages and disadvantages of plane tabling in survey. 5M

   b) Tabulate the advantages and disadvantages and one practical use of each of the three methods of orienting a plane table. 9M

UNIT-V

9. a) Explain the purpose of setting curves? Write the elements of a simple circular curve and also explain how a simple circular curve is designated. 7M

   b) List the various methods of setting out a simple circular curve and explain briefly the Rankine method of deflection angles. 7M

OR

10. a) Describe how a total station has brought revolution in surveying. 4M

    b) Write about setting up and orientation of a total station. 5M

    c) Briefly explain the principle of EDM. 5M

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Hall Ticket Number :										

R-14

Code: 4G633

II B. Tech. I-Semester Supplementary Examinations May/June 2016

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70Marks)

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UNIT-I

1. a) A square metal plate 1.8 m side and 1.8 mm thick weighing 60 N is to be lifted through a vertical gap of 30 mm of infinite extent. The oil in the gap has a specific gravity of 0.95 and viscosity of 4 N.s/m^2. If the metal plate is to be lifted at a constant speed of 0.12m/s find the force and power required

   b) The velocity distribution for flow over a plate is given by $u=2y-y^2$ where u is the velocity in m/s at a distance y meters above the plate. Determine the velocity gradient and shear stress at the boundary and 0.15 m from it. Take dynamic viscosity of fluid as 1 N.s/m^2.

OR

2. a) An isosceles triangular plate of base 4 m and altitude 4 m is immersed vertically in an oil of specific gravity 0.8. The base of the plate coincides with the free surface of oil. Determine total pressure on the plate and centre of pressure.

   b) Derive the expressions for total pressure and centre of pressure for a horizontally immersed plane surface.

UNIT-II

3. The velocity components in a two-dimensional flow field for an incompressible fluid are $u=(y^3/3)+2x-x^2y$ and $v=xy^2-2y-(x^3/3)$ obtain an expression for stream function.

OR

4. A conical tube of length 3 m is fixed vertically with its smaller end upwards. The velocity of flow at the smaller end is 4 m/s while at the lower end it is 2 m/s. The pressure head at the smaller end is 2 m of liquid. The loss of head in the tube is $0.94\,(v_1-v_2)^2/2g$, where v_1 is the velocity at the smaller end and v_2 at the lower end respectively. Determine the pressure head at the lower end. Flow takes place in downward direction.

UNIT-III

5. a) Give the laws of fluid friction.

   b) Define and differentiate HGL and TEL.

OR

6. A rectangular notch of crest width 0.4 m is used to measure the flow of water in a rectangular channel 0.6m wide and 0.45m deep. If the water level in the channel is 0.225m above the weir crest, find the discharge in the channel. For the notch assume c_d=0.63and take velocity of approach into account.

UNIT-IV

7. Calculate the pressure gradient along the flow, the average velocity and the discharge for an oil of viscosity 0.02 Ns/m^2 flowing between two stationary parallel plates 1 m wide maintained 10 mm apart. The velocity midway between the plates is 2.5 m/s.

OR

8. Derive Hagen-Poiseullie equation from basics.

UNIT-V

9. When can you tell that similarity is existing between a model and a prototype?

OR

10. a) Explain any three model laws.

    b) In a geometrically similar model of spillway the discharge per meter length is 1/6 m^3/s. If the scale of the model is 1/36 find the discharge per meter length of the prototype.

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