Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations November 2019

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ 6M

b) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 3 & 3 & 1 \end{bmatrix}$ and hence find A^4. 8M

OR

2. a) Solve the equations x+2y+3z=0;3x+4y+4z=0;7x+10y+12z=0 7M

b) Find the Eigen values and Eigen vectors $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ 7M

UNIT–II

3. From the following table of values of 'x' and 'y', obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x=1.5

X	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

14M

OR

4. From the following table, estimate the number of students who obtained marks between 40 and 45 using Newton's interpolation formula

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

14M

UNIT–III

5. Using Euler's Method, find an approximate value of y corresponding to $x = 1$, given $\frac{dy}{dx} = x + y$ and $y = 1$ when x=0. 14M

OR

6. Using Picard's process of successive approximation, obtain a solution up to fifth approximation of the equation $\frac{dy}{dx} = x + y$ such that $y = 1$ when x=0.Check your answer by finding the exact solution. 14M

UNIT–IV

7. a) Find the half range cosine series for the function $f(x) = x$, when $0 < x < ®$ hence show that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{®^2}{8}$ 8M

   b) Form a partial differential equation by eliminating the arbitrary function f from $z = f\left(x^2 + y^2\right)$. 6M

OR

8. Form the partial differential equation by eliminating arbitrary function from $F\left(x + y + z, x^2 + y^2 + z^2\right) = 0$ 14M

UNIT–V

9. a) Show that the polar form of Cauchy's Riemann equations are $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \_}, \frac{\partial v}{\partial r} = \frac{1}{r}\frac{\partial u}{\partial \_}$ 7M

   b) Evaluate $\int_c \frac{e^z}{(z-1)^3} dz$ with C: $|z-1| = \frac{1}{2}$ using Cauchy's Integral Formula 7M

OR

10. If $f(z)$ regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\left|f(z)\right|^2 = 4\left|f'(z)\right|^2$ 14M

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Hall Ticket Number :										

R-14

Code: 4G633

II B.Tech. I Semester Supplementary Examinations November 2019

Fluid Mechanics

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) Define total pressure and centre of pressure. Also derive the expressions for the same for an inclined immersed surface. 7M

   b) Define pressure. Obtain an expression for the pressure intensity at a point in a static fluid. 7M

OR

2. a) Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 2 m below the fee surface of water. Find the position of centre of pressure also. 7M

   b) Define the term 'meta-centre'. Derive an expression for the meta-centric height of a floating body. 7M

UNIT–II

3. a) Explain the classification of fluid flow in detail. 7M

   b) If for a two-dimensional potential flow, the velocity potential given is by Φ 4x(3y-4), determine the velocity at the point (2,3). Determine also the value of stream function ψ at the point (2,3). 7M

OR

4. a) Derive the Bernoulli's equation for steady flow of an incompressible fluid. 7M

   b) A 45^o reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm^2 and rate of flow water is 600 litres/ s. 7M

UNIT–III

5. a) Derive the Darcy-Weisbach equation. 7M

   b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if friction factors are 0.02, 0.0208 and 0.0192 respectively, considering major losses and neglecting minor losses. 7M

OR

6. a) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take C_d = 0.98. 7M

   b) Water flows through a triangular right-angled weir first and then over a rectangular weir of 1 m width. The discharge co-efficients of the triangular and rectangular weirs are 0.6 and 0.7 respectively. If the depth of water over the triangular weir is 360 mm, find the depth of water over the rectangular weir. 7M

UNIT–IV

7. a) Describe the Reynolds' experiment with a neat sketch. 7M

   b) Derive an expression for the velocity distribution for viscous flow through a circular pipe. Also sketch the velocity distribution and shear stress distribution across a section of the pipe. 7M

OR

8. a) Calculate: (i) the pressure gradient along the flow, (ii) the average velocity and (iii) 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 m/s. 7M

   b) Explain with a neat sketch, hydrodynamically smooth and rough boundaries. 7M

UNIT–V

9. a) Explain the Buckingham's π- theorem of dimensional analysis. 7M

   b) The resisting force R of a supersonic plane during flight can be considered as dependent upon the length of the aircraft l, velocity V, air viscosity μ, air density ρ and bulk modulus of air K. Express the functional relationship between these variables and the resisting force by using Buckingham's π- theorem. 7M

OR

10. a) Explain the geometric, kinematic and dynamic similarities. 7M

    b) In a 1:30 model of a spillway, the velocity and discharge are 1.5 m/s and 2m^3/s. Find the corresponding velocity and discharge in the prototype. 7M

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Hall Ticket Number :										

R-14

Code: 4G631

II B.Tech. I Semester Supplementary Examinations November 2019

Strength of Materials-I

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) Draw the stress – strain diagram for mild steel specimen and discuss salient points on it. 7M

   b) Find the elongation in a round bar 50 mm diameter subjected to an axial load of 60 kN. Also find the values of modulus of rigidity and bulk modulus taking Poisson's ratio as 0.3 and modulus of elasticity as 200 GPa. 7M

OR

2. a) A compound bar is made of 60 mm wide and 10 mm thick plate placed on 60mm wide and 10 mm thick copper plate placed one above the other. The ends are rigidly fixed and the length of the compound bar is 600 mm. The compound bar is stress free at 30^0 C. Find the stresses induced in the steel and copper plates if he temperature is raised to 90^0 C. Take Es = 2×10^5 MPa, Ec = 1×10^{-5} MPa, $\alpha_s = 12 \times 10^{-6}$ / ^{0} C and $\alpha_c = 18 \times 10^{-6}$ / ^{0} C 7M

   b) Derive an expression for strain energy for a member subjected to a gradually applied axial load. 7M

UNIT–II

3. a) Draw the shear force and bending moment diagrams for a cantilever beam of length 'l' subjected to a point load 'W' at its free end. 4M

   b) A simply supported beam of length 1 m is supported at its ends and carries concentrated loads of 30 kN and 60 kN at distances 300 mm and 750 mm from left support. Draw the shear force and bending moment diagrams indicating their values at salient points. 10M

OR

4. a) Draw the shear force and bending diagrams for a simply supported beam of length 'l' subjected to an UDL of 'w' N/m over entire span. 6M

   b) A cantilever beam of length 1.2 m carries a concentrated load of 30 kN at a distance of 0.3 m from fixed end and a uniformly distributed load of 10 kN/m over a span of 0.4 m starting from free end. Draw the shear force and bending moment diagrams indicating the values. 8M

UNIT–III

5. a) Sketch the bending stress distribution in a beam of rectangular cross section. 4M

   b) A simply supported beam of rectangular cross section 200 mm wide and 300mm deep, supports a UDL of intensity 'w' N/m length over a span of 4 m. Calculate the safe intensity of the UDL if he allowable bending and shear stresses are 90 MPa and 30 MPa respectively. 10M

OR

6. a) Sketch the shear stress distribution for a circular cross section of diameter 'd'. 4M

   b) A simply supported beam of I-section and 1.2 m long, has each flange as 200 mm wide and total depth of 400 mm, with flanges and web thickness of 20 mm each. It carries a central load of 60 kN. Find the maximum bending stress induced. 10M

UNIT-IV

7. a) Derive the differential equation for elastic curve of a beam subjected to transverse loading. 6M

   b) A cantilever beam of length 'L' carries a udl of 'w' N/m over entire span. Determine the deflection and slope at the free end. 8M

OR

8. A simply supported beam of length 1.2 m is supported at its ends and carries concentrated loads of 10 kN and 30 kN at distances 400 mm and 800 mm respectively from left support. The moment of inertia of the section is $1.6x10^9 mm^4$ and E = 210 GPa. Find the deflection of the beam at load points. 14M

UNIT-V

9. An element is subjected to the following stresses: 90 MPa in X-direction, 60 MPa in Y-direction and a complementary shear stress of 30 MPa on these planes. Find:
   i) Normal and shear stresses along a plane inclined at 30^0 with the plane of 90MPa.
   ii) Maximum and minimum principal stresses and
   iii) Maximum shear stress. 14M

OR

10. a) Explain the following theories of failure:
      i) Maximum normal stress theory and
      ii) Von Mises Theory 4M

   b) A bolt is subjected to a tensile load of 12 kN and a transverse shear load of 6kN. Find the core diameter of the bolt according to :
      i) Maximum normal stress theory and
      ii) Maximum shear stress theory.

   Take allowable normal and shear stresses for the bolt material as 90 MPa and 60 MPa respectively. 10M

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Hall Ticket Number :										

R-14

Code: 4G632

II B.Tech. I Semester Supplementary Examinations November 2019

Surveying

(Civil Engineering)

Max. Marks: 70 Time: 3 Hours

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

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UNIT–I

1. a) Describe about the various types of tape corrections in chain surveying. 5M

   b) The area of the plan of an old survey plotted to a scale of 10 metres to 1 cm measures now as 100.2 sq.cm as found by a planimeter. The plan is found to have shrunk so that a line originally 10 cm long now measures 9.7 cm only. Find (i) the shrunk scale, (ii) true area of the survey. 4M

   c) What are the various types of chains? Describe them. 5M

OR

2. a) Write the difference between prismatic and surveyors compass. 5M

   b) Following are the bearings taken in a closed compass traverse.

Line	F.B.	B.B.
AB	S37º30′E	N37º30′W
BC	S43º15′W	N44º15′E
CD	N73º00′W	S72º15′E
DE	N12º45′E	S13º15′W
EA	N60º00′E	S59º00′W

   Compute the interior angles and correct them for observational errors. 7M

   c) Write the relations between Whole Circle and Reduced Bearing System in all quadrants. 2M

UNIT–II

3. a) Discuss the Trapezoidal rule for calculating area. 3M

   b) A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 meters in the following order. 0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85 m Compute the area between the chain line, the curved boundary and the end offsets by (**i**) Average ordinate rule, (**ii**) Trapezoidal rule, and (**iii**) Simpson's rule. 7M

   c) A railway embankment 400 m long is 12 m wide at the formation level and has the side slope 2 to 1. The ground levels at every 100 m along the centre line are as under:

Distance	0	100	200	300	400
R.L.	204.8	206.2	207.5	207.2	208.3

   The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork. 4M

OR

4. a) What are the different types of Bench Marks? Explain them. 3M

   b) The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings : 2.225 ; 1.605 ; 0.990 ; 2.090 ; 2.865 ; 1.260 ; 0.600 ; 1.980 ; 1.045 ; 2.685 meters.

   Enter the above readings in a page of a level book and calculate the R.L. of points if the first reading was taken with a staff held on a bench mark of 432.384 m. 7M

   c) Write the uses of contour maps. 4M

UNIT–III

5. a) Discuss the method of repetition for measuring the horizontal angle. 7M

   b) Write the functions of theodolites. 7M

OR

6. a) Write down the procedure of measuring deflection angles by theodolite with diagram. 7M

   b) Explain the errors in theodolite work. 7M

UNIT–IV

7. a) What are the errors in plane tabling? 5M

   b) Write the advantages and disadvantages of plane tabling. 5M

   c) Explain temporary adjustment and setting up of plane table in the field. 4M

OR

8. a) A tacheometer was set up at station P and observations were made to a staff held normal to the line of sight over point Q. The vertical angle measured was 6°36'. The three hair readings were 1.905, 2.480, and 3.055. The reading from P, with the line of sight horizontal to a BM of RL 852.55 was 1.855. If the instrument constants are 100 and 0.5, find the RL of Q. 5M

   b) Write the advantages and disadvantages of subtense method over stadia method. 2M

   c) Explain the principle of stadia method. 7M

UNIT–V

9. a) Write the relation between degree and radius of curve. 3M

   b) A road 8 m wide is to deflect through an angle of 60° with the centre line radius of 300 m, the chainage of the intersection point being 3605.0 m. A transition curve is to be used at each end of the circular curve of such a length that the rate of gain of radial acceleration is 0.5 m/s^3, when the speed is 50 km/h. Find out:

   (i) Length of the transition curve
   (ii) Superelevation
   (iii) Chainage of all junction points.
   (iv) Offsets at x = L/4, L/2, 3L/4 and L 7M

   c) Discuss the various types of vertical curve. 4M

OR

10. a) Write the methods of ranging of simple circular curve with proper sketch. 7M

    b) Two straight AB and BC intersect at a chainage of 4242.0 m. The angle of intersection is 140°. It is required to set out a 5° simple circular curve to connect the straights. Calculate all the data necessary to set out the curve by the method of offsets from the chord produced with an interval of 30 m. 7M

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