Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations May 2017

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 = 70Marks)

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UNIT–I

1\. a) Find the values of a and b for which the equations $x+ay+z=3,\ x+2y+2z=b,\ x+5y+3z=9$ are consistent. When will these equations have a unique solution? 8M

b) Find the rank of the matrix $\begin{bmatrix} 5 & 5 & 5 & 5 \\ 1 & 4 & 0 & 7 \\ 0 & -2 & 1 & 3 \end{bmatrix}$ by reducing it into Row-Echelon form. 6M

OR

2\. a) Prove that the sum of the eigen values of a matrix is the sum of the elements of the principal diagonal. 6M

b) Verify Cayley-Hamilton theorem for A=$\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ and hence find A^{-1} and A^3. 8M

UNIT–II

3\. a) Find a recurrence formula to calculate $\sqrt{N}$ using Newton-Raphson method and hence evaluate $\sqrt{17}$. 7M

b) Estimate the values of $f(1.2)$ and $f(2)$ from the date given.

x	1	1.4	1.8	2.2
$f(x)$	3.49	4.82	5.96	6.5

7M

OR

4\. The following table gives the velocity v of a particle at time t :

t (sec)	0	2	4	6	8	10	12
v (m/s)	4	6	16	34	60	94	136

Find the distance moved by the particle in 12 seconds and also the acceleration at t = 6 seconds. 14M

UNIT–III

5\. Find $y(0.1)$ and $y(0.5)$ by Taylor's series method from $\frac{dy}{dx}=xy+1,\ y(0)=1$. Compare the numeric solution with its exact solution. 14M

OR

6\. Apply Milne's method to find a solution of $\frac{dy}{dx}=x-y^2,\ y(0)=0$ in the range $0 \le x \le 1$. 14M

UNIT–IV

7. Obtain Fourier series of a function $f(x) = |x|, \; -® < x < ®$ and hence deduce that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + - - - -- = \frac{®^2}{8}.$$ 14M

OR

8. a) Form the partial differential equation by eliminating arbitrary constants a, b, c from $(x-a)^2 + (y-b)^2 + z^2 = c^2$. 8M

b) Solve $\frac{\partial^2 z}{\partial x \partial y} - \frac{x}{y} = 100$ by the method of separation of variables. 6M

UNIT–V

9. Find the analytic function $f(z) = u + iv$, if $2u + v = e^x(\cos y - \sin y)$. 14M

OR

10. a) Evaluate $\oint_c \frac{e^z \cos z}{\left(z - \frac{®}{2}\right)^2} dz$, where c is $|z| = 2$. 10M

b) Evaluate $\oint_c z^2 \cot z \, dz$, where c is the unit circle. 4M

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Hall Ticket Number :										

R-14

Code: 4G633

II B.Tech. I Semester Supplementary Examinations May 2017

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) State and prove Pascal's law 7M

   b) The surface tension of water in contact with air at 20 ^{0}C is 0.078 N/m. The pressure inside a water droplet is 0.22KN/m^2 greater than the outside pressure. Calculate the diameter of the water droplet. Derive the equation used. 7M

OR

2. a) Derive an expression for total pressure for a vertical plane surface submerged in liquid. 6M

   b) A circular plate 3 m diameter is immersed in water in such a way that its greatest and least depth below the free surface is 4 m and 1.5 m respectively. Determine the total pressure on one face of the plate and position of the centre of pressure. 8M

UNIT–II

3. a) Describe the use and limitations of flow nets 4M

   b) The following cases represent the two velocity components. $u = 5x^2 - 5xy$; $v = 3xy - 2y + z^3$. Determine the third component of velocity such that they satisfy the continuity equation. 10M

OR

4. a) What is impulse-momentum theorem? Derive the same 7M

   b) Water under pressure of 3.924x10^{-3} N/m^2 is flowing through a 0.3 m pipe at the rate of 0.25 cumecs. If the pipe is bent by 135^0, find the magnitude and direction of the resultant force on the bend. 7M

UNIT–III

5. a) Explain the laws of fluid friction 4M

   b) Determine the difference in the elevations between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 0.30 m and length 400 m. The rate of flow of water through the pipe is 0.30 m^3/sec. Consider all losses and take the value of f = 0.016. 10M

OR

6. a) Sketch a Pitot tube and explain how it is used to measure the velocity of a flowing liquid 5M

   b) The inlet and throat diameter of a Venturimeter are 0.3 m and 0.15 m, respectively. The liquid flowing through the meter is water. The pressure intensity at inlet is 137.34 kN/m^2, while the vacuum pressure head at the throat is 0.37 m of mercury. Find the rate of flow. Assume that 4% of the differential head is lost between the inlet and the throat. Find also the value of C_d for the Venturimeter. 9M

UNIT–IV

7. a) What do you mean by Viscous flow? 2M

   b) An oil of viscosity 0.1 N-Sec/m^2 and relative density 0.90 is flowing through a circular pipe of diameter 50 mm and of length 300 m. The rate of flow of fluid through the pipe is 0.0035 lit/sec. Find the pressure drop in a length of 300 m and also the shear stress at the pipe wall. 12M

OR

8. a) What is the difference between hydro dynamically smooth and rough pipes? 4M

   b) Calculate: (i) the pressure gradient along flow, (ii) the average velocity, and (iii) the discharge for an oil of viscosity 0.02 N-s/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 10M

UNIT–V

9. a) Explain the term "dimensionally homogeneous equation" 4M

   b) A spillway model is to be built to geometrically similar scale of 1/50 across a flume of 600 mm width. The prototype is 15 m high and maximum head on it is expected to be 1.5 m. **(i)** what height of model and what head on the model should be used? (**ii**) If the flow over the model at a particular head is 0.012 m^3 per second, what flow per metre length of the prototype is expected? (**iii**) If the negative pressure in the model is 200 mm, what is the negative pressure in prototype? Is it practicable? 10M

OR

10. a) Define and explain Reynold's number, Froude's number and Mach number. 6M

    b) The discharge Q over a small rectangular weir is known to depend upon the head H over the weir, the weir height P, gravity g, width of the weir L and fluid properties: density ρ, dynamic viscosity μ and surface tension σ. Express the relationship between the variables in dimensionless form 8M

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Hall Ticket Number :										

R-14

Code: 4G632

II B.Tech. I Semester Supplementary Examinations May 2017

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) A chain line CDE crosses a river, D and E being on the near and distant banks respectively. A perpendicular DF, 54m long, is set out as D on the left of the chain line. The respective bearings of E and C taken as F are 67°30' and 157°30'. Find the chainage of E, given that CD is 27m and the chainage of D is 376.5m. 10M

   b) Explain the following.
   (i) True bearings
   (ii) Magnetic declinations

OR 4M

2. a) What is meant by chain surveying? Explain its principle. 7M

   b) The following offsets were taken from a chain line to a hedge.

Distance in m :	0	8	16	24	32	48	64	88	112
Offset in m :	3.76	4.32	5.44	4.88	3.84	3.36	3.00	2.52	1.84

   compute the area in square metres included between the chain line , the hedge and the end offsets by Simpsons rule. 7M

UNIT–II

3. Two pegs A and B were 750 m apart across a wide river. The following readings were taken with one level

Level at	Reading on A	Reading on B
A	1.543	2.847
B	1.422	2.622

   The error in the collimation adjustment of the level was + 0.002 m per 100m. Determine the true difference of level between A and B and the refraction 14M

OR

4. Explain the characteristics of contour lines and their uses 14M

UNIT–III

5. Explain the temporary and permanent adjustments of vernier transit. 14M

OR

6. The following are the interior angles of a closed traverse ABCDE.
   < A, 78°12'40" : < B, 168°33'50" ; < C, 84°22'30" ; < D, 115°43'25" < E, 90°7'35" .
   If the observed bearing of AB is 138°42'20", compute the bearings of the remaining sides. 14M

UNIT–IV

7. Explain the following.
   (i) Anaiiatical lens
   (ii) Inclined sights 14M

OR

8. Explain the components of a plane table with neat sketch. 14M

UNIT–V

9. Explain the various methods of determining the length of a transition curve. 14M

OR

10. Explain the following.
    (i) Cubic spiral
    (ii) Vertical curve
    (iii) Reverse curve 14M

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