USN | | | | | | | | | |

14MAT11

First Semester B.E. Degree Examination, June/July 2015

Engineering Mathematics - I

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

MODULE- I

1 a. If y ym + y ^{4} . 2x prove that
(x2 — 1)Y n+2 + (2n +1)xy$_{n+1}$ + (n^2 - m^2)y. = 0 (07 Marks)

b. Find the pedal equation for the curve
el = am sin m0 + bm cos m0 (06 Marks)

c. Derive an expression to find radius of curvature in cartesian forntd (07 Marks)

OR

2 a. Find the nth derivative of sin^{2}x cos^{3}x (07 Marks)

b. Show that the curves r = a(1+cos 0) and r = b (1-cos0 niehect at right angles. (06 Marks)

c. Find the radius of curvature when x = a log (sect + t ct. (07 Marks)

MODULEnl)

3 a. Using Maclaurin's series expand tan x upto ilNitirm c (07 Marks)

b. Show that $x\frac{au}{5x} + y\frac{au}{ay} = 2u \log u$ wh 6 $\log u = \frac{x^3 \div y}{3x + 4y}$ (06 Marks)

c. Find the extreme values S^{11}(x - 02 (07 Marks)

OR

aluate $\lim_{x \to 0} \frac{ex \sin x X"L x^2}{x^2 + x \log(1- x)}$ (07 Marks)

b. If u = x log xy Okre x^3 + y^3 + 3xy =1 Find $\frac{du}{dx}$ (06 Marks)

c. If u = v = $\frac{xz}{y}$, w = $\frac{xy}{z}$, limo $\frac{a(u,v,w)}{a(x, y, z)}$. (07 Marks)

MODULE- III

5 a. Find div F and Curl F where
F. grad (x^3 + y^3 + z^3 -3xyz) (07 Marks)

b. Using differentiation under integral sign,
Evaluate $\int_0^1 \frac{x^a - 1}{\log x} dx$ (a, 0)
Hence find $\int_0^1 \frac{x^3 - 1}{\log x} dx$ (06 Marks)

c. Trace the curve y^2(a - x^3, a > Ouse general rules. (07 Marks)

OR

Important Note : 1. On completing your answers, compulsorily ... 2. Any revealing of identification, appeal to ev...

6 a. If r = xi + yj + z k and r= |r| then prove that V rn = n r'² r (07 Marks)

b. Find the constants a, b, c such that F = x + y + az)i + (bx + 2y — z)j + + cy + 2z)k is irrotational. Also find (I) such that F = V4 (06 Marks)

C. Using differentiation under integral sign,

Evaluate e'' sin x / x dx (07 Ma

MODULE— IV

7 a. Obtain reduction formula for cos' x dx (07 Marks)

b. Solve : (1 + 2xy cos x² — 2xy)dx + (sin x² — x²)dy = 0 (06 Marks)

c. A body originally at 80°C cools down to 60°C in 20 minutes, the temperature of the air being 40°C. What will be temperature of the body after 40 minutes from the original ? (07 Marks)

OR

8 a. Evaluate x² 112a) (² dx (07 Marks)

b. Solve : xy(1+ x y² 4 =1 dx (06 Marks)

c. Find the orthogonal trajectories of the family of confocal conics x²/a² + y²/b² =1 where k is parameter. (07 Marks)

MODULE— V

Solve by Gauss elimin p method
5x₁ + X₂ + X₃ + X₄ =4, x₁ + 7X₂ + X₃ + X₄ =12, x₁ +X₂ +6X₃ + X₄ = —5,
x₁ + x₂ +X₃ +4b9-6 (07 Marks)

b. Diagonali*Ore matrix A = —19 7 / — 42 16 (06 Marks)

c. Find: the eigen value and the corresponding eigen vector of the matrix

6	—2	2
—2	3	—1
2	—1	3

by power method taking the initial eigen vector (1, 1, 1)' (07 Marks)

OR

10 a. Solve by L U decomposition method
x+5y+z=14, 2x+y+3z=14, 3x+y+4z=17 (07 Marks)

b. Show that the transformation $y_1 = 2x_1 - 2x_2 - x_3$, $y_2 = -4x_1 + 5x_2 + 3x_3$, $y_3 = x_1 - x_2 - x_3$ is regular and find the inverse transformation. (06 Marks)

c. Reduce the quadratic form $2x_1^2 + 2x_2^2 + 2x_3^2 + 2x_1x_3$ into canonical form by orthogonal transformation. (07 Marks)

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