

F.Y.B.SC. SEM – II (2014 Course) : SUMMER - 2019
SUBJECT : MATHEMATICS : INTEGRAL CALCULUS & DIFFERENTIAL EQUATIONS (M – 22)

Day : Friday
 Date : 03/05/2019

Time : 03.00 PM TO 05.00 PM
 Max. Marks : 40

S-2019-0962

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.

Q.1 Attempt **ANY TWO** of the following: **[10]**

- a) Prove that $\int \tan^n x \, dx = \frac{\tan^{n-1} x}{n-1} - \int \tan^{n-2} x \, dx$ and hence evaluate $\int \tan^4 x \, dx$.
- b) Evaluate : $\int \frac{x^2 + 1}{(x+2)^3 (x-1)} \, dx$.
- c) Evaluate : $\int \frac{x-8}{(2x-1)(x^2+x+3)} \, dx$.

Q.2 Attempt **ANY TWO** of the following: **[10]**

- a) Define homogeneous differential equation and explain the method to find the general solution of its.
- b) Solve : $xy - \frac{dy}{dx} = y^3 e^{-x^2}$.
- c) Solve : $(x^3 + xy^4)dx + 2y^3 dy = 0$.

Q.3 Attempt **ANY TWO** of the following: **[10]**

- a) Find the area of the surface of revolution generated by revolving about the x – axis, the arc of the parabola $y^2 = 12x$ from $x = 0$ to $x = 3$.
- b) Find the volume of the solid generated by revolving about x – axis, the area cut off from the parabola $9y = 4(9 - x^2)$ by the line $4x + 3y = 12$.
- c) Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$.

Q.4 Attempt **ANY FIVE** of the following: **[10]**

- a) Find the circumference of circle $x^2 + y^2 = a^2$ by integration method.
- b) Evaluate : $\int_0^{\pi/2} \cos^{12} x \, dx$.
- c) Evaluate : $\int_0^{\pi/2} \sin^8 x \cos^{10} x \, dx$.
- d) Evaluate : $\int \sec^4 x \, dx$
- e) Solve : $(x^2 - 2xy - y^2) \, dx - (x+y)^2 \, dy = 0$.
- f) Obtain the integrating factor of the differential equation
 $(xy + 2x^2 y^2) \, y \, dx + (xy - x^2 y^2) \, x \, dy = 0$.
- g) Obtain the differential equation of the family of circles given by
 $x^2 + y^2 + 2cx + 2c^2 - 1 = 0$.

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