F.Y.B.SC. SEM – II (2014 Course) : WINTER - 2018
SUBJECT :MATHEMATICS: INTEGRAL CALCULUS & DIFFERENTIAL EQUATIONS

Day : Thursday   **W-2018-0796**   Time : 03.00 PM TO 05.00 PM
Date : 25/10/2018   Max. Marks :40

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) Define homogenous differential equation and explain the method of its general solution.

  b) Solve: $3\dfrac{dy}{dx}+\dfrac{2}{x+1}y=\dfrac{x^3}{y^2}$.

  c) Solve: $(x^2+y^2)\,dx = 2\,xy\,dy$.

Q.2 Attempt **ANY TWO** of the following: (10)

  a) Evaluate $\displaystyle\int\dfrac{dx}{a+b\cos x}$ if $i)\ a > b\ and\ ii)\ a < b$.

  b) Evaluate : $\displaystyle\int\dfrac{x^2+1}{x^4+1}dx$.

  c) Evaluate: $\displaystyle\int\dfrac{(x-8)}{(2x-1)(x^2+x+3)}dx$.

Q.3 Attempt **ANY TWO** of the following: (10)

  a) Evaluate the surface area of the solid generated by revolving the cycloid $x = a(\theta-\sin\theta)$, $y = a(1-\cos\theta)$, about the line $y = 0$.

  b) Find the length of the arc of the parabola $x^2 = 4ay$ measured from the vertex to one extremity of the latus rectum .

  c) Find orthogonal trajectories of the family of $y = ae^{-2x}$.

Q.4 Attempt **ANY FIVE** of the following: (10)

  a) Evaluate $\displaystyle\int\cos ec^4 x\,dx$

  b) Prove that $\displaystyle\int\tan^n x\,dx = \dfrac{\tan^{n-1} x}{n-1} - \int\tan^{n-2} x\,dx$.

  c) Evaluate: $\displaystyle\int_{0}^{\frac{\pi}{4}} 4\cos^4 x\sin^4 x\,dx$.

  d) Find the volume of the sphere of radius a, by integration .

(P.T.O.)

e) Solve: $(y + yx^2)\,dy - (2x - 2x\,y^2)\,dx = 0$.

f) Obtain the differential equation of which $xy = ae^x + be^{-x}$ is the solution where a and b being arbitrary constants.

g) Obtain the integrating factor of the following differential equation:
$(x^2y - 2\,xy^2)\,dx - (x^3 - 3\,x^2y)\,dy = 0$.

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