



TEST PAPER: MATHEMATICS

Time: 80 Minutes

Class: 12th J.E.E.

Max. Marks: 40 Marks

Date: 29th August, 2018

Marking Scheme: Questions carry 10 marks each. Questions have 3 subparts each. Subparts (a) and (b) carry 3 marks each and subpart (c) carries 4 marks. All questions are compulsory.

Question 1:

A. Find:

$$\int e^{3x} \cos 2x dx$$

B. Using integration find the area of region bounded by the triangle whose vertices are (1,0), (2,2) and (3,1).

C. Find:

$$\int \frac{x+2}{2x^2+6x+5}$$

Question 2:

A. Find the area bounded by the curves $y = 6x - x^2$ and $y = x^2 - 2x$.

B. Find the general solution of the differential equation $y dx - (x + 2y^2) dy = 0$.

C. Find the particular solution, given that, $x = 0$ when $y = 1$:

$$2y e^{\frac{x}{y}} dx + \left(y - 2x e^{\frac{x}{y}} \right) dy = 0$$

Question 3:

A. Find the points on the curve $9y^2 = x^3$ where the normal to curve makes equal intercepts with the axes.

B. Find the intervals in which the functions given below are decreasing & increasing:

$$f(x) = \frac{3}{10}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$$

C. Find the equation of a curve passing through the point (0, 1). If the slope of the tangent to the curve at any point (x, y) is equal to the sum of the x coordinate (abscissa) and the product of the x coordinate and y coordinate (ordinate) of that point.

Question 4:

A. Verify Rolle's Theorem

$$f(x) = x^3 - 6x^2 + 11x - 6 \text{ on } [1, -3]$$

B. Show that $f(x) = |x + 3|$ is continuous but not differentiable at $x = -3$

C. Using differentials, find the approximate value of the following upto 3 places of decimals:

a) $3.968^{3/2}$ b) $\frac{1}{\sqrt{25.1}}$