## KGCE | Sem-II | CBGS | App. Maths. II / 22.11.16



## 3 Hours

Q.P. Code: 529901

Total Marks: 80

(1) N.B.:- Question no 1 is compulsory.

(2) Attempt any THREE questions out of remaining FIVE questions.

1)a) Solve 
$$\left[\log(x^2 + y^2) + \frac{2x^2}{x^2 + y^2}\right] dx + \left(\frac{2xy}{x^2 + y^2}\right) dy = 0$$

b) Solve 
$$(D^4 + 2D^2 + 1)y = 0$$
 (3)

c) Evaluate 
$$\int_{0}^{\infty} e^{-x^{5}} dx$$
 (3)

Express the following integral in polar co-ordinates: 
$$\int_{0}^{a} \sqrt{a^{2}-y^{2}} f(x,y) dx dy$$

e) Prove that 
$$E = 1 + \Delta = e^{hD}$$
 (3)

f) Evaluate 
$$I = \int_{0}^{\pi/2} \int_{\pi/2}^{\pi} \cos(x+y) dx dy$$
 (3)

Solve 
$$\frac{dy}{dx} + \frac{y}{x} \log y = \frac{y}{x^2} (\log x)^2. \tag{6}$$

Change the order of integration and evaluate 
$$I = \int_{0}^{2} \int_{\sqrt{2y}}^{2} \frac{x^2 dx dy}{\sqrt{(x^4 - 4y^2)}}$$
 (6)

Evaluate 
$$\int_{0}^{\pi/2} \frac{dx}{1 + a \sin^2 x}$$
 and deduce that 
$$\int_{0}^{\pi/2} \frac{\sin^2 x dx}{(3 + a \sin^2 x)^2} = \frac{\pi \sqrt{3}}{96}$$
 (8)

Evaluate 
$$I = \iiint e^{x+y+z} dx dy dz$$
 (6)

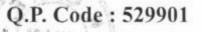
If mass per unit area varies as the square of the ordinate of a point, find the mass of a lamina bounded by the cycloid 
$$y = a(1 - \cos\theta)$$
,  $x = a(\theta + \sin\theta)$  and the ordinates from the two cusps and the tangents at the vertex

Solve 
$$(2x+1)^2 \frac{d^2y}{dx^2} - 6(2x+1)\frac{dy}{dx} + 16y = 8(2x+1)^2$$
 (8)

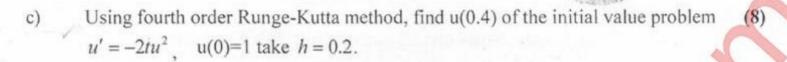
Show that the length of the arc of the parabola 
$$y^2 = 4ax \, cut \, off \, by \, the \, line$$

$$3y = 8x \quad is \quad a \left[ \log 2 + \frac{15}{16} \right]$$
(6)

Solve 
$$\frac{d^3y}{dx^3} - 7\frac{dy}{dx} - 6y = \cos x \cosh x$$
 (6)



2



- Use method of variation of parameters to solve  $\frac{d^2y}{dx^2} 5\frac{dy}{dx} + 6y = e^{2x}x^2.$
- Using Taylor's series method, obtain the solution of  $\frac{dy}{dx} = 3x + y^2$ , y(0) = 1 (6)

Find the value of y for x = 0.1 correct to four decimal places

Find the value of the integral  $\int_{0}^{1} \frac{x^2}{1+x^3} dx$  by taking h= 0.2, using (8)

(i) Trapezoidal Rule (ii) Simpson's 1/3 Rule.

Compare the errors with the exact value of the integral A condenser of capacitance C is charged through a resistance R by a steady (6) voltage. The charge Q satisfies the DE  $R\frac{dQ}{dt} + \frac{Q}{c} = V$ . If the plate is chargeless find the charge and the current at time 't'

b) Evaluate  $\iint \frac{(x^2 + y^2)^2}{x^2 y^2} dxdy$  over the region common to  $x^2 + y^2 - ax = 0$  and  $x^2 + y^2 - by = 0$ , a > 0, b > 0?

Find the volume common to the right circular cylinder  $x^2 + y^2 = a^2$  and  $x^2 + z^2 = a^2$