

FE-II (CBSGS)
 App. Maths - II
 (REVISED COURSE)

18/11/2014

QP Code : 11859

(3 Hours)

Total Marks : 80

- N. B. :** (1) Question No.1 is compulsory.
 (2) Attempt **any three** questions of the remaining five.
 (3) **figures** to the right indicate **full marks**.

1. (a) Evaluate $\int_0^2 x^4 (8-x^3)^{-1/3} dx$ 3
- (b) Solve $\frac{d^4 y}{dx^4} + 2\frac{d^2 y}{dx^2} + y = 0$ 3
- (c) Prove that $E = 1 + \Delta = e^{4D}$ 3
ehD
- (d) Solve $[x\sqrt{x^2+y^2} - y]dx + [y\sqrt{x^2+y^2} - x]dy = 0$ 3
- (e) Change to polar coordinates and evaluate $\int_0^{2a} \int_0^{\sqrt{2ax-x^2}} \frac{x}{\sqrt{x^2+y^2}} dy dx$ 4
- (f) Evaluate $\int_0^1 \int_0^x e^{x+y} dy dx$ 4
(Zero)
2. (a) Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$ 6
- (b) Change the order of integration and evaluate $\int_0^a \int_{y^2/a}^y \frac{y}{(a-x)\sqrt{ax-y^2}} dx dy$ 6
- (c) Prove that $\int_0^\infty \cos \lambda x (e^{-ax} - e^{-bx}) dx = \frac{1}{2} \log \left(\frac{b^2 + \lambda^2}{a^2 + \lambda^2} \right)$, $a > 0$, $b > 0$ using DUIS rule 8
(Zero)
3. (a) Evaluate $\iiint \frac{dx dy dz}{x^2 + y^2 + z^2}$ throughout the volume of the sphere $x^2 + y^2 + z^2 = a^2$ 6
- (b) Find the area common to the cardioids $r = a(1 + \cos \theta)$ and $r = a(1 - \cos \theta)$. 6
- (c) Apply the method of variation of parameters to solve $\frac{d^2 y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{2x} \sec^2 x$ 8
4. (a) Find the length of one arc of the cycloid $x = a(\theta - \sin \theta)$ and $y = a(1 + \cos \theta)$ 6
- (b) Solve $\frac{d^2 y}{dx^2} + 2y = x^2 e^{3x} + e^x \cos x$ 6