

FE (APPLIED MATHEMATICS -II)
Internal Assessment Test-I

Date: 20/02/2015

Time: 10.30 – 11.30 am

Max marks: 20

Note the following instructions.

1. All questions are compulsory.
2. Draw neat diagrams wherever necessary.
3. Write everything in ink (no pencil) only.

Q.1 Attempt any five

- a. Find value of $B\left(4, \frac{5}{3}\right)$ [2m]
- b. Evaluate $\int_0^{\infty} e^{-x} x^3 dx$ [2m]
- c. Evaluate $\int_0^{\pi/2} \sqrt{\tan \theta} d\theta$ [2m]
- d. Evaluate $\int_1^2 \int_0^x \frac{dy dx}{x^2 + y^2}$ [2m]
- e. Evaluate $\iint xy dx dy$ over the area bounded by the curves $y = x^2$ and $x = -y^2$ [2m]
- f. Assuming $\int_0^{\pi} \frac{dx}{a - \cos x} = \frac{\pi}{\sqrt{a^2 - 1}}$, ($a > 0$) deduce that [2m]
- $$\int_0^{\pi} \frac{dx}{(2 - \cos x)^2} = \frac{2\pi}{3\sqrt{3}}$$

Q.2 Attempt any one

- a. Show that $\int_0^{2a} x^2 \sqrt{2ax - x^2} dx = \frac{5}{8} a^4 \pi$ [5m]
- b. Prove that $\int_0^{\infty} \frac{1 - \cos mx}{x} \cdot e^{-x} dx = \frac{1}{2} \log(m^2 + 1)$ [5m]

Q.3 Attempt any one

- a. Change the order of integration $\int_0^{2a} \int_{\sqrt{2ax - x^2}}^{\sqrt{2ax}} f(x, y) dy dx$. [5m]
- b. Evaluate $\iint x^2 + y^2 dx dy$ over the area of the triangle whose vertices are (0,1) (1,1) (1,2). [5m]

ALL THE BEST