

FACULTY OF ENGINEERING AND TECHNOLOGY

B.E./B.Tech. II - Year II - Semester (New) (Main) Examination, June, 2011

MATHEMATICS

200192

Time : 3 Hours]

[Max. Marks : 75

Note : Answer all questions of Part - A.

Answer five questions from Part - B.

PART - A

25

1. Define Probability. 2
2. Find the median from the distribution of marks obtained by 49 students. 3
3. Verify the Rolle's theorem for $\frac{\sin x}{e^x}$ in $(0, \pi)$. 3
4. The curvature of the circle $x^2 + y^2 = 25$ at the point $(3, 4)$ is _____. 2
5. The surface area of a sphere of radius 4 cm. is _____. 2
6. $\iint dx dy$ over the area bounded by $x=0, y=0, x^2 + y^2 = 1$ and $x^2 = 4y$ is _____. 3
7. If F is solenoidal, then $\nabla \cdot F =$ _____. 2
8. If $F = axi + byj + czk$, then $\int_s F \cdot ds$, s being the surface of a unit sphere is : 3
(a) $4\pi/3 (a + b + c)$ (b) 0
(c) $4/3 \pi (a + b + c)^2$ (d) $1/2$
9. Find $\beta(1/2, 1/2)$ 2
10. The value of $\Gamma(3.5)$ is _____. 3

Contd...2

PART - B

50

11. State and prove addition and multiplication theorems for discrete random variables. 10
12. (a) State and prove Cauchy's Mean Value Theorem. 5
 (b) Find the Taylor's series for $f(x) = \sin x$ in powers of $(x - \pi/4)$. 5
13. Find the volume of the ellipsoid $x^2/a^2 + y^2/b^2 + z^2/c^2 = 1$. 10
14. (a) Find the directional derivative of $f(x, y, z) = 2xy + z^2$ at $(1, -1, 3)$ in the direction of $i + 2j + 2k$. 5
 (b) If $\vec{F} = 3xyi + y^2j$, evaluate $\int_c \vec{F} \cdot d\vec{r}$, where c is the curve in the xy -plane $y = 2x^2$ from $(0, 0)$ to $(1, 2)$. 5
15. (a) Define Beta and Gamma functions. 5
 (b) Show that $\Gamma \frac{1}{2} = \sqrt{\pi}$ 5
16. (a) Find the envelope of $x/a \cos \alpha + y/b \sin \alpha = 1$, α is the parameter. 5
 (b) Find the radius of curvature of the curve $x = at^2$, $y = 2at$ at any point. 5
17. (a) Apply Stoke's theorem, evaluate $\oint_C (x + y) dx + (2x - z) dy + (y + z) dz$, where C is the boundary of the triangle with vertices $(2, 0, 0)$, $(0, 3, 0)$ and $(0, 0, 6)$ 5
 (b) Evaluate $\int_0^{\infty} x^2 e^{-x^2} dx$. 5