Code No. 2405/CBCS/BL

FACULTY OF ENGINEERING

B.E./B.Tech. (Bridge Course) II-Semester (Backlog) Examination, November 2020

Subject : Mathematics

Time : 2 Hours **Max. Marks: 75**

Note: Answer any seven questions from Part-A & any three questions from Part-B.

PART – A (7x3=21 Marks)

1 Define (i) Probability (ii) Impossible and (iii) Certain event
2 Two coins are tossed simultaneous. Find the sample space.
3 Verify Rolle's theorem for $f(x) = x^2$ in [-2, 2].
4 Find the radius of curvature of the curve $y^2 = x$ at (1, 1).
5 Integrate $\sin^2 x$.
6 Evaluate $\int_0^1 \int_0^1 \int_0^1 dz\ dy\ dx$.
7 Find the normal and unit normal vector to the surface xy + 2z = 8 at (1, 2, 3).
8 Show that $\vec{F} = yz\ \hat{i} + xz\ \hat{j} + xy\ \hat{k}$ is solenoidal.
9 Show that $\beta(m, n) = \beta(n, m)$.
10 Define error function and complementary error function.

PART – B (3x18=54 Marks)

11 (a) Find the mean and mode for the following distribution.

x	1	2	3	4	5	6
f	9	8	12	11	13	7

(b) State and prove addition theorem of probability.

12 (a) Explain $f(x)=e^x \sin x$ in powers of x upto the term x^5.
(b) Find the curvature and radius of curvature of the curve $x^2y= x^2+y^2$ and (-2, 2).

13 (a) Find the volume of the solid generated by revolving the region bounded by $y = \sqrt{x}$, $y = 0$ and x =9 about x-axis.
(b) Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx\ dy$ by changing to polar coordinates.

14 Verify Green's theorem for $\oint_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the square bounded by the lines $x = \pm 1,\ y = \pm 1$.

15 (a) Evaluate $\int_0^\infty \sqrt{x}\ e^{-x^2}\ dx$ using Gamma function.
(b) Show that $\beta(m, n) = \frac{\Gamma m \Gamma n}{\Gamma(m+n)}$.

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16 (a) State and prove Cauchy's mean value theorem.

(b) Find the envelope of the family of curves $x\cos\alpha + y\sin\alpha = 5$.

17 (a) Find the angle between the surface $x^2 + y^2 + z^2 = 9$ and $z = x^2 + y^2 - 3$ At (2, -1, 2).

(b) Find the divergence and curl of the vector

$$\vec{F} = (x^2 - yz)\hat{i} + (y^2 - zx)\hat{j} + (z^2 - xy)\hat{k}$$

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