Unit - V

5. a) Find the mean deviation from mean for normal distribution.

b) Prove that total probability of Beta distribution of second kind is 1.

c) Define the following:

i) Probability function

ii) Probability mass function

iii) Probability density function

d) Find the students t-statistic for the following variable values in a sample $-4, -2, -2, 0, 2, 2, 3, 3$ taking the mean of the universe to be zero.

OR

A dice is tossed 120 times with the following results:

No. of turned up :	1	2	3	4	5	6	Total
Frequency :	30	25	18	10	22	15	120

Test the hypothesis that the dice is unbiased

$\left(\chi^2_{0.05,5} = 11.07 \right)$

******

BE-401

B.E. IV Semester

Examination, June 2016

Mathematics - III

(Common for all Branches)

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Find the kind of singularity of the function $f(z) = \dfrac{z-2}{z^2} \sin\left(\dfrac{1}{(z-1)}\right)$.

b) If $f(z)$ is a regular function of z, prove that

$$\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} \right) |f(z)|^2 = 4|f'(z)|^2$$

c) Show that the function $u = e^{-2xy} \sin(x^2 - y^2)$ harmonic and find the conjugate function v.

d) Evaluate $\displaystyle\int_0^{\pi} \left(\frac{1 + 2\cos\theta}{5 + 4\cos\theta} \right) d\theta$

OR

Using Cauchy's Integral formula, prove that

$$\int_c \frac{e^{2z}}{(z+1)^4} dz = \frac{8\pi e^{-2}}{3} i$$

where c is the circle $|z| = 3$.

Unit - II

2. a) If 0.333 is the approximate value of 1/3, find the absolute, relative and percentage errors.

   b) Find the real root of the equation $x \log_{10} x = 1.2$ by Regula falsi method correct to two decimal places.

   c) Using Newton-Raphson method find a real root of the equation $3x = \cos x + 1$.

   d) Solve the equations:

   $10x + 2y + z = 9$

   $-2x + 3y + 10z = 22$

   $x + 10y - z = -22$

   By Gauss Seidel method.

   OR

   Solve by Gout's method

   $10x + y + z = 12$

   $2x + 10y + z = 13$

   $2x + 2y + 10z = 14$

Unit - III

3. a) Express $y = 2x^3 - 3x^2 + 3x - 10$ in factorial notation.

   b) Write Stirling's formula for equal interval.

   c) Find the first term of the series whose second and subsequent terms are 8, 3, 0, −1, 0.

   d) Apply Lagrange's method to find the value of x, when $f(x) = 15$, from the given data.

x	5	6	9	11
y	12	13	14	16

OR

Apply Bessel's formula to evaluate y_{25}, given $y_{20} = 2854$, $y_{24} = 3162$, $y_{28} = 3544$, $y_{32} = 3992$

Unit - IV

4. a) Solve $\frac{dy}{dx} = 1 - 2xy$ given that $y(0) = 0$, by Taylor's method.

   b) From the following data, find the number of items n. Where $r = 0.5$, $\sum xy = 120$, $\sigma_y = 8$, $\sum x^2 = 90$, where x and y are deviations of arithmetic mean.

   c) Find $y(2.2)$ using Euler's method for the equation $\frac{dy}{dx} = -xy^2$ with $y(2) = 1$.

   d) Using Runge-Kutta method of fourth order solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ at $x = 0.2$ and 0.4.

OR

Fit a straight line to the following data:

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15