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BICE-007

B.Tech. – VIEP – Computer Science & Engg. (BTCSVI) / B.Tech. Electronics and Communication Engg. (BTECVI) / B.Tech. Electrical Engg. (BTELVI)

00655

Term-End Examination

June, 2019

BICE-007 : MATHEMATICS-III

Time : 3 hours *Maximum Marks : 70*

Note : *All questions are* ***compulsory****. Attempt any* ***two*** *parts from each question. Use of non-programmable scientific calculator is permitted. All questions are carrying equal marks. Statistical tables may be provided.*

1. (a) Write Cauchy's theorem, and verify it by integrating e^{iz} along the boundary of the triangle, having vertices at points $1 + i$, $-1 + i$ and $-1 - i$.

(b) Find Taylor and Laurent series of

$$f(z) = \frac{3 - 2z}{z^2 - 3z + 2}, \text{ when}$$

(i) $1 < |z| < 2$

(ii) $|z| > 2$

(c) Let f(z) be analytic function in a simply connected domain D. Then show that for any point z_0 in D and any simple closed path C in D that encloses z_0

$$\oint_C \frac{f(z)}{z - z_0}\, dz = 2\pi i\, f(z_0).$$

2×7=14

2. (a) Calculate the first four central moments of the following distribution about the mean :

X :	0	1	2	3	4	5	6	7	8
Frequency of X :	1	8	28	56	70	56	28	8	1

State whether the distribution is Leptokurtic or Platykurtic.

(b) Using the method of Least Squares, determine the curve $y = ax + bx^2$ that best fits the following data :

X :	1	2	3	4	5
Y :	1·8	5·1	8·9	14·1	19·8

(c) A five digit number is formed by using 0, 1, 2, 3, 4 without repetition. Find the probability that the number is divisible by 4.

2×7=14

3. (a) Determine 95% confidence interval for the mean 'μ' of a normal population with variance $\sigma^2 = 16$, using a sample of size 200 with mean 74·81.

(b) In a production of iron rods, let the diameter (X) be normally distributed with mean 2 inch and standard deviation (σ) of 0·008 inch. What percentage of defectives can we expect, if we set tolerance limits at $2 \pm 0{\cdot}02$ inch ?

(c) Write short notes on any ***two*** of the following :

(i) Statistical Quality Control Methods

(ii) Control Charts

(iii) ANOVA *2×7=14*

4. (a) Using Newton Raphson method, find the real roots of the equation $3x - \cos x + 1 = 0$ between 0 and 1, correct up to two decimal places.

(b) Use Lagrange's interpolation formula to fit a polynomial to the data given below :

X :	– 1	0	2	3
f(X) :	– 8	3	1	12

Hence find the value of f(1).

(c) Find root of equation $xe^x - 1 = 0$, correct to three decimal places, using Bisection method. *2×7=14*

5. (a) Solve the following system of equations by using Gauss-Seidel iteration method :

$$4X + Y + 2Z = -1$$

$$X + 5Y + Z = 5$$

$$2X + Y + 4Z = 3$$

(b) Evaluate the integral $I = \int_0^1 e^{x^2} dx$ by Simpson's $\frac{1}{3}$rd and $\frac{3}{8}$th rule. Compare the results. Take $h = 0{\cdot}2$.

(c) Solve the Ordinary Differential Equation

$$\frac{dy}{dx} = x(y - x), \ y(z) = 3,$$

using Runge-Kutta's method of fourth order (take step size $h = 0{\cdot}1$). Hence find value of $y\,(2{\cdot}2)$. *2×7=14*