

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

00434

Term-End Examination

June, 2017

BICE-007 : MATHEMATICS-III

Time : 3 hours

Maximum Marks : 70

Note : All questions are **compulsory**. Use of scientific calculator is permitted.

1. Answer any **two** of the following : 2×7=14

(a) Show that the function

$$u(x, y) = x^4 - 6x^2y^2 + y^4 \text{ is harmonic.}$$

Also, find the analytic function

$$f(z) = u(x, y) + iv(x, y).$$

(b) Verify the Cauchy theorem by integrating e^{iz} along the boundary of the triangle with the vertices at the points $1 + i$, $-1 + i$ and $-1 - i$.

(c) Evaluate $\int_C \frac{z^2 - 2z}{(z+1)^2 (z^2 + 4)} dz$, where C is

the circle $|z| = 10$.

2. Answer any **two** of the following :

2×7=14

(a) In a certain distribution, the first four moments about the point $x = 4$ are -1.5 , 17 , -30 and 308 . Find the moments about mean and about origin.

(b) By the method of least squares, find 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) Find the coefficient of correlation for the following table :

x	10	14	18	22	26	30
y	18	12	24	6	30	36

3. Answer any **two** of the following : $2 \times 7 = 14$

(a) Out of 800 families with 4 children each, how many families would be expected to have

(i) 2 boys and 2 girls ?

(ii) at least one boy ?

(iii) no girl ?

Assume equal probabilities for boys and girls.

(b) During an examination of equal length of cloth, the following are the number of defects observed :

2, 3, 4, 0, 5, 6, 7, 4, 3, 2

Draw a control chart for the number of defects and comment whether the process is under control or not.

(c) In a bolt factory, machines A, B and C manufacture respectively 25%, 35% and 40% of the total production. Of their output, 5, 4 and 2 percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine B ?

4. Answer any *two* of the following :

$2 \times 7 = 14$

- (a) Find a positive value of $(17)^{1/3}$ correct to six decimal places by Newton-Raphson method.
- (b) The population of a town in the decennial census was as given below. Estimate the population for the year 1895 :

Year x	Population y (in thousands)
1891	46
1901	66
1911	81
1921	93
1931	101

- (c) Use Lagrange's interpolation formula to fit a polynomial to the data :

x	-1	0	2	3
f(x)	-8	3	1	12

Hence, find the value of $f(1)$.

5. Answer any *two* of the following :

2×7=14

- (a) Solve by Crout's method, the following system of equations :

$$x + y + z = 3$$

$$2x - y + 3z = 16$$

$$3x + y - z = -3$$

- (b) The table given below reveals the velocity 'v' of a body during the time 't' specified. Find its acceleration at $t = 1.1$.

$$t: \quad 1.0 \quad 1.1 \quad 1.2 \quad 1.3 \quad 1.4$$

$$v: \quad 43.1 \quad 47.7 \quad 52.1 \quad 56.4 \quad 60.8$$

- (c) Find the value of $y(1.1)$ using Runge-Kutta method of fourth order, given that $\frac{dy}{dx} = y^2 + xy$, $y(1) = 1.0$, take $h = 0.05$.
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