

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

Term-End Examination

00083

June, 2018

BICE-007 : MATHEMATICS-III.

Time : 3 hours

Maximum Marks : 70

Note : *All questions are compulsory. Attempt any two parts from each question. Use of scientific calculator is permitted. All questions are carrying equal marks.*

1. (a) Show that the function $u = x^3 - 3xy^2$ is harmonic and find the corresponding analytic function. $2 \times 7 = 14$

- (b) State Cauchy-integral theorem for an analytic function. Verify this theorem by integrating the function $z^3 + iz$ along the boundary of the rectangle with vertices $+1, -1, i, -i$.

- (c) Evaluate the following integral using Cauchy integral formula :

$$\int_C \frac{4 - 3z}{z(z-1)(z-2)} dz, \text{ where } C \text{ is the}$$

$$\text{circle } |z| = \frac{3}{2}.$$

2. (a) The first four moments of a distribution about the value '4' of the variable are -1.5 , 17 , -30 and 108 . Find the moments about mean, about origin, β_1 and β_2 . Also find the moment about the point $x = 2$. $2 \times 7 = 14$

- (b) Find the least squares fit of the form $y = a_0 + a_1x^2$ to the following data :

x :	-1	0	1	2
y :	2	5	3	0

- (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. (a) Six dice are thrown 729 times. How many times do you expect at least three dice to show a five or six? $2 \times 7 = 14$

- (b) Fit a Poisson distribution to the following data and calculate theoretical frequencies.

Deaths :	0	1	2	3	4
Frequencies :	122	260	15	2	1

- (c) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution. It is given that if

$$f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-\frac{1}{2}x^2} dx$$

then $f(0.5) = 0.19$ and $f(1.4) = 0.42$.

4. (a) Using Newton-Raphson method, find the real root of the equation $3x = \cos x + 1$ correct to four decimal places. $2 \times 7 = 14$
- (b) From the following table of half-yearly premium for policies maturing at different ages, estimate the premium for policies maturing at the age of 46.

Age	45	50	55	60	65
Premium (in ₹)	114.84	96.16	83.32	74.48	68.48

- (c) Using Lagrange's interpolation formula, find $y(10)$ from the following table :

x :	5	6	9	11
y :	12	13	14	16

5. (a) Solve the following system of equations by the LU factorization method : $2 \times 7 = 14$

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$

- (b) Find $f'(1.1)$ from the following table :

x	f(x)
1.0	0.0
1.2	0.1280
1.4	0.5540
1.6	1.2960
1.8	2.4320
2.0	4.000

- (c) Using Runge-Kutta method of fourth order approximate y when $x = 0.1$, given that $y = 1$ at $x = 0$ and $\frac{dy}{dx} = 3x + y^2$.