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

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Term-End Examination

December, 2018

BICE-007 : MATHEMATICS-III

Time : 3 hours   *Maximum Marks : 70*

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

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

    (a) Find an analytic function whose imaginary part is $e^{-x}(x \cos y + y \sin y)$.

    (b) Verify Cauchy's integral theorem for $f(z) = z^2$ taken over the boundary of a square with vertices at ± 1, $\pm i$ in counter-clockwise direction.

(c)   Use Cauchy's integral formula to evaluate
$\int_C \dfrac{z}{z^2 - 3z + 2} \, dz$, where C is the circle
$|z - 2| = \dfrac{1}{2}$.

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

(a)   The first four moments of a distribution
about x = 2 are 1, 2·5, 5·5, and 16.
Calculate the first four moments about the
mean and about origin.

(b)   Use the method of least squares to fit the
curve
$$y = \dfrac{C_0}{x} + C_1 \sqrt{x}$$ to the following table
of values :

x	y
0·1	21
0·2	11
0·4	7
0·5	6
1	5
2	6

(c)   Calculate the coefficient of correlation for the following data :

Husband's age (in yrs) x	Wife's age (in yrs) y
23	18
27	20
28	22
28	27
29	21
30	29
31	27
33	29
35	28
36	29

3.   Attempt any *two* of the following :   *2×7=14*

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

(i)   2 boys and 2 girls, and

(ii)   at least one boy.

(b)   Six coins are tossed 6400 times. Using the Poisson distribution, determine the approximate probability of getting six heads x times.

(c) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2·5. Assuming the distribution to be normal, find

(i) How many students score between 12 and 15 ?

(ii) How many students score above 18 ?

(iii) How many students score below 8 ?

4. Attempt any *two* of the following : $2 \times 7 = 14$

(a) Using Newton's iterative method, find the real root of $x \log_{10} x = 1·2$, correct to six decimal places.

(b) From the following table, estimate the number of students who obtained marks between 40 and 45 :

Marks	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
No. of students	31	42	51	35	31

(c) By means of Newton's divided difference formula, find the values of $f(8)$ and $f(15)$ from the following table :

x	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

5. Attempt any *two* of the following :   *2×7=14*

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

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

(b) A rod is rotating in a plane. The following table gives the angle θ (in radians) through which the rod has turned for various values of time t (in seconds) :

t	0	0·2	0·4	0·6	0·8	1·0	1·2
θ	0	0·12	0·49	1·12	2·02	3·20	4·67

Calculate the angular velocity and angular acceleration of the rod at t = 0·6 sec.

(c) Use the Runge-Kutta fourth order method to find the value of y when x = 1. Given that y = 1 when x = 0 (taking n = 2) and $\dfrac{dy}{dx} = \dfrac{y - x}{y + x}$.

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