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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)

00235

## Term-End Examination
## December, 2014

## BICE-007 : MATHEMATICS-III

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt any **seven** questions. All questions carry equal marks.*

**1.** (a) Let $f : S \to S$, with $S'$ an open set. If $f(z) = u + iv$, suppose $z = x + iy$ is point of S and $f'(z)$ exists. Then show that at $(x, y)$ $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial v}{\partial x} = -\frac{\partial u}{\partial y}$. 5

(b) Evaluate, $\oint_c \frac{\sin 3z}{z^2 + 4} dz$, where c is the circle $|z| = 1$. 5

**2.** (a) Using contour integration, show that $\int_0^\infty \frac{1}{(1 + x^4)} dx = \frac{\pi}{2\sqrt{2}}$. 5

(b) Find Taylor and Laurent series of $f(z) = \dfrac{3 - 2z}{z^2 - 3z + 2}$ *5*

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

(ii) $|z| > 2$.

**3.** (a) Apply Newton's method to the equation $f(x) = x^3 + x - 1 = 0$. Find a +ve root. *5*

(b) Find the smallest positive solution of $\sin x = e^{-x}$ by Regula-Falsi method up to four decimals. *5*

**4.** (a) Compute f(9·2) from the given values, by Newton's divided difference interpolation formula. *5*

| x : | 8·0 | 9·0 | 9·5 | 11·0 |
|---|---|---|---|---|
| f(x) : | 2·079442 | 2·197225 | 2·251292 | 2·397895 |

(b) Derive Newton's forward difference interpolation formula. *5*

**5.** Apply the Runge-Kutta method to the following initial value problem, choosing h = 0·2.

$$\frac{dy}{dx} = f(x, y) = x + y, \quad y(0) = 0.$$

Find y (0·2). *10*

6. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's $3/8^{th}$ rule. Take $h = \frac{1}{6}$. *5*

(b) Solve the system

$$8x_2 + 2x_3 = -7$$

$$3x_1 + 5x_2 + 2x_3 = 8$$

$$6x_1 + 2x_2 + 8x_3 = 26$$

by Crout's method. *5*

7. In a production of iron rods, let the diameter X be normally distributed with mean 2 inches and standard deviation 0·008 inch.

(a) What percentage of defectives can we expect, if we set the tolerance limits at $2 \pm 0{\cdot}02$ inches ?

(b) How should we set the tolerance limits to allow for 4% defective ? *10*

8. (a) Fit a straight line to the following data :

Temperature x (°F)

32 50 100 150 212

Conductivity of water y [Btu/hr.ft. °F]

0·337 0·345 0·365 0·380 0·395.

Also find the thermal conductivity of water at room temperature 66°F. *5*

(b) If A and B are events in a sample space S, and $P(A) \neq 0$, $P(B) \neq 0$, then show that

$P(A \cap B) = P(A)\, P(B/A) = P(B)\, P(A/B)$. *5*

**9.** (a) Show that the coefficient of correlation lies between – 1 and 1. *5*

(b) Compute the coefficient of skewness from the following data : *5*

| x | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|
| f | 3 | 6 | 9 | 13 | 8 | 5 | 4 |

**10.** Write short notes on any ***two*** of the following : *2×5=10*

(a) Chi-square ($\chi^2$) Test (with an example)

(b) Analysis of variance (one way)

(c) P, np and C charts