

(BTCSVI / BTCEVI / BTELVI) B. Tech. (Degree)

Term-End Examination

June, 2011

BICE-007 : MATHEMATICS - III

Time : 3 hours

Maximum Marks : 70

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

1. (a) If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$, find $f(z)$ in terms of z . 7
- (b) Find the Laurent's expansion for : 7

$$f(z) = \frac{7z-2}{z^3 - z^2 - 2z} \text{ in the regions given by}$$

$$(i) \quad 0 < |z+1| < 1 \quad (ii) \quad 1 < |z+1| < 3$$

2. (a) Determine the poles of the following function and residues at each pole : 7

$$f(z) = \frac{z-1}{(z+1)^2(z-2)}$$

- (b) For a moderately skewed data, the arithmetic mean is 100, the variance is 35 and Karl Pearson's coefficient of skewness is 0.2. find its mode and median. 7

3. (a) Employ the method of least squares to fit a parabola $y = a + bx + cx^2$ in the following data : 7
 data :
 $(x,y) : (-1, 2), (0,0), (0,1), (1,2)$.
- (b) Compute the rank correlation coefficient for the following data : 7

Person :	A	B	C	D	E	F	G	H	I	J
Rank in maths :	9	10	6	5	7	2	4	8	1	3
Rank in physics :	1	2	3	4	5	6	7	8	9	10

4. (a) For 10 observations on price (x) and supply (y), the following data were obtained
 $\Sigma x = 130$, $\Sigma y = 220$, $\Sigma x^2 = 2288$,
 $\Sigma y^2 = 5506$, and $\Sigma xy = 3467$.
 Obtain the two lines of regression and estimate the supply when the price is 16 units. 7
- (b) Find the probability that at most 5 defective components will be found in a lot of 200, if experience shows that 2% of such components are defective. Also, find the probability of more than 5 defective components. (Given : $e^{-4} = 0.018$). 7
5. (a) Using Regula-falsi method, find the smallest positive root of the equation $x - e^{-x} = 0$ correct to three decimal places. 7

- (b) Find the cubic polynomial which takes the following values : 7

x	: 0	1	2	3
$f(x)$: 1	2	1	10

6. (a) Using Simpson's one-third rule , evaluate 7

$$\int_0^6 \frac{dx}{(1-x)^2} \text{ with six subintervals.}$$

- (b) Apply Runge-Kutta method to solve the 7

differential equation $\frac{dy}{dx} = xy^{1/3}$, $y(1) = 1$ for $y(1.1)$.

7. Attempt *any two* parts : 2x7=14

- (a) Find the order of convergence of Newton-Raphson method.
- (b) State and prove Cauchy's Integral formula.
- (c) Define Chi-square test with its parameters and discuss the properties of chi-square test.
- (d) Define t-distribution with its parameters and discuss the properties of t-distribution.
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