

## FACULTY OF ENGINEERING

B.E. II/IV Year (ECE/Mech./Prod./CSE/Auto Mobile Engg.) II Semester  
(Main) Examination, May/June, 2011

## MATHEMATICS – IV

Time : 3 Hours]

[Max. Marks : 75

Answer all questions of Part A.

Answer five questions from Part B.

## Part A – (Marks : 25)

1. For the function  $f(z) = z$  the following is true.

- (a)  $f(z)$  is not continuous at  $Z = 0$
- (b)  $f(z)$  is differentiable at every point.
- (c)  $f(z)$  is not differentiable at every point.
- (d) None of above.

2. Find  $\xi_C \frac{2z^3 + 4z}{Z - 2i} dz$  where C is the circle  $|z| = 4$ .3. Expand the function  $f(z) = e^z$  in Taylor's series about  $z = 1$ .4. Residue of  $f(z) = \cot z$  at singular points (a) 1 (b) 0 (c)  $\pi/2$  (d)  $\pi/2$ 

5. A random variable X has the following probability distribution

x	0	1	2	3	4
p(x)	k	k	2k	$k^2$	$3k^2$

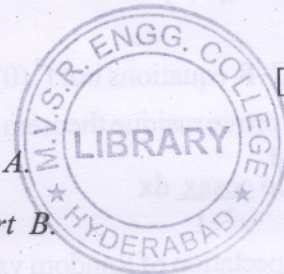
find  $P(x < 3)$ 6. If  $f(x)$  is density function of continuous random variable X, then the moment generating function of X about  $x=a$  is \_\_\_\_\_.7. X is a normal variate with mean 30 and standard deviation 5. Find the probability that  $26 \leq x \leq 40$ .

8. Write the equations of line of regression of x on y and y on x.

9. Find the student's - t for the following variable in a sample of eight -4, -2, -2, 0, 2, 2, 3, 3 taking the mean of the universe to be zero.

10. State the following true or false.

- (a) The variable of poisson distribution with parameter  $\lambda = 2$  then variance of poisson distribution is 4.
- (b) Standard normal variable parameters are 0 and 1.



11. (a) State and prove Cauchy's integral theorem.  
 (b) Prove that the function  $f(z)$  defined by:

$$f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^3 + y^2} \quad \text{O, if } z = 0$$

satisfies C-R equations but  $f'(0)$  does not exist.

12. (a) State and prove residue theorem.

(b) Evaluate  $\int_0^d \frac{\cos x}{x^2+1} dx$

13. (a) Define expectation of Random variable. The probability density function of a random variable is given by

$$f(x) = \begin{cases} \frac{1}{2}(x+1), & -1 \leq x \leq 1 \\ 0, & \text{elsewhere} \end{cases}$$

then find  $E(x)$  and variance of  $X$ .

- (b) The joint probability density function of continuous random variable  $(X, Y)$  is given  $f(x, y) = ke^{-(x+y)}$   $x > 0, y > 0$ .

Find the value of  $k$ .

14. (a) Fit a Poisson distribution to the set of observations:

x:	0	1	2	3	4
f:	122	60	15	2	1

- (b) Find mean and variance of normal distribution.

15. Find correlation co-efficient between  $x$  and  $y$  for the given values. Find the two regression lines also.

x:	1	2	3	4	5	6	7	8	9	10
y:	10	12	16	28	25	36	41	49	40	50

16. (a) If  $f(z)$  is analytic function with constant modules, show that  $f(z)$  is constant.

- (b) State and prove Baye's theorem.

17. (a) Expand  $f(z) = \frac{1}{(z-1)(z-2)}$  in the region  $1 < |z| < 2$ .

- (b) The values in two random samples are given below :

Sample 1: 15    25    16    20    22    24    21    17    19    23

Sample 2: 35    31    25    38    26    29    32    34    33    27    29    31

Can we conclude that the two samples are drawn from the same population. Test at 5% level of significance.