

Roll No

BE - 401

B.E. IV Semester Examination, June 2015

Mathematics - III

(Common for all Branches)

Time : Three Hours

Maximum Marks :70

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
 ii) All parts of each questions are to be attempted at one place.  
 iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.  
 iv) Except numericals, Derivation, Design and Drawing etc.

## Unit - I

1. a) Show that  $u = 2x - x^3 + 3xy^2$  is harmonic.  
 b) Use Cauchy - Riemann equation to find  $v$ . Where  $u = 3x^2y - y^3$ .  
 c) Find the order of each pole and residue at it of  $\frac{1-2z}{z(z-1)(z-2)}$ .  
 d) Expand  $f(z) = \frac{1}{(z-1)(z-2)}$  in the region  $|z| > 2$ .

OR

Evaluate  $\int_0^{2\pi} \frac{d\theta}{(a+b \cos \theta)^2}$ ,  $a > b > 0$ .

## Unit - II

2. a) Find the relative error of  $\frac{2}{3}$  is approximate to 0.667.  
 b) Give convergence values of Regula falsi, Secant method and Newton Raphson method.  
 c) Find the real root of the equation  $(48)^{1/3}$  by Iteration method upto two decimal places.  
 d) Solve by Gauss elimination method:  
 $10x + y + 2z = 13$   
 $3x + 10y + z = 14$   
 $2x + 3y + 10z = 15$

OR

Apply Crout's method to solve the equation.

$$3x + 2y + 7z = 4$$

$$2x + 3y + z = 5$$

$$3x + 4y + z = 7$$

## Unit - III

3. a) Find the function whose first difference is  $9x^2 + 11x + 5$ .  
 b) Evaluate  $\int_0^6 \frac{1}{1+x^2} dx$  by using Simpson's  $\frac{1}{3}$  rule.

- c) Find the missing values of the following data :

$x$	0	5	10	15	20	25
$y$	6	10	-	17	-	31

- d) Use Newton's divided difference formula to find the formula of  $f(x)$  given :

$x$	0	2	3	6
$f(x)$	648	704	729	792

OR

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

## Unit - IV

4. a) Using Picards method to obtain  $y$  for  $x = 0.1$ , if  $\frac{dy}{dx} = 1 + xy$ , with  $y(0) = 1$ .  
 b) Prove if one of the regression coefficient is greater than unity, then the other is less than unity.  
 c) From the following data obtain the value of the correlation coefficient:  $n = 10$ ,  $\Sigma x = 55$ ,  $\Sigma y = 40$ ,  $\Sigma x^2 = 385$ ,  $\Sigma y^2 = 192$  and  $\Sigma (x + y)^2 = 947$ .  
 d) Apply Runge-Kutta method to find a approximate value of  $y$  when  $x = 0.1$ . If  $\frac{dy}{dx} = x + y^2$  given that  $y(0) = 1$ .

OR

Calculate the coefficient of regression lines and find the two lines of regression from the following data :

$x$	78	89	97	69	59	79	68	61
$y$	125	137	156	112	107	136	123	108

## Unit - V

5. a) Give conditions for the validity of  $\chi^2$  test.  
 b) Define:  
 i) Discrete and continuous random variable  
 ii) Student's T-test  
 c) Derive the expression for mean and variance of Binomial distribution.  
 d) The mean height of 500 students is 151 cm and the standard deviation is 15 cm. Assuming that the heights are normally distributed. Find how many students have heights between 120 and 155 cm.

OR

In a laboratory experiment, two samples gave the following results :

Sample	Size	Sample Mean	Sum of squares of deviation from the mean
I	10	15	90
II	12	14	108

Test the equality of sample variance at 05% level of significance ( $F_{9,11(0.05)} = 2.90$ ).