Code No. 6057 / M

FACULTY OF ENGINEERING

B.E. 2/4 (ECE/M/P/ AE/CSE) II – Semester (Main) Examination, June 2014

Subject : Mathematics – IV

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1 Evaluate $\int_C \frac{2z+1}{(z+1)(z-1)(z+2)}dz$, where c is $|z|=\frac{3}{2}$ by using residue theorem. (3)

2 Evaluate $\int_0^{1+i}(x^2+iy)dz$ along y = x. (2)

3 Find the zeros of $f(z)=e^z-1$. (3)

4 Determine the points at which the mapping w = sin πz is not conformal. (3)

5 A, B are two mutually exclusive events of a random experiment. If $P(AUB)=0.75$ and $P(\overline{A})=0.6$ then find P(B). (3)

6 Find the expectation of Gamma variate with one parameter. (2)

7 A continuous random variable x has the pdf (3)

$f(x)=\begin{cases} a+bx & 0\le x\le 1 \\ 0 & \text{elsewhere} \end{cases}$ If the mean of the distribution is $\frac{1}{3}$, find the values of a, b.

8 Write 4 properties of normal distribution. (2)

9 Write the normal equations of the curve $y = a + bx + cx^2$. (3)

10 Two random variables have the regression lines with equations 3x + 2y = 26 and 6x + y = 31. Find the mean values and the correlation coefficient between x and y. (2)

PART – B (50 Marks)

11 a) Show that $J\left(\frac{u,v}{x,y}\right)=|f'(z)|^2$ where f(z) = u(x, y) + iv(x, y), and J is the Jabocian. (5)

b) State and prove Cauchy's integral formula. (5)

12 a) Evaluate $\int_{-\infty}^{\infty}\frac{dx}{(x^2+a^2)^2}$. (5)

b) Expand $\frac{7z-2}{(z+1)z(z-2)}$ in the region 1<|z + 1|<3 (5)

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13 a) State and prove Baye's theorem. (5)

b) If X is a random variable with probability distribution function (5)

x	0	1	2	3	4	5	6
P(x)	0.15	0.1	0.05	0.3	0.2	0.1	0

find E(x + 1), E(3x + 2), V(3x + 4).

14 a) Derive the MGF of normal distribution. (5)

b) Two random samples of sizes 9 & 6 are given the following values of the variate. (5)

Sample-I	15	22	28	26	18	17	29	21	24
Sample-II	8	12	9	16	15	10	-	-	-

Test the difference of estimates of the population variances at 5% level of significance. [$F_{0.05}$ at (8, 5) df = 3.69].

15 Find the correlation coefficient between x & y for the following values and also the regression lines. (10)

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

16 a) Prove that $u = x^2 - y^2$, $v = \frac{y}{x^2 + y^2}$ are harmonic. (5)

b) Find the bilinear transformation which maps the points z = -1, i, 1 into w = 1, -i, -1. (5)

17 a) Fit a Poisson distribution to the following data. (5)

x	0	1	2	3	4
f(x)	46	38	22	9	1

b) Evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \sin\theta}$. (5)

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