**MODEL QUESTION PAPER I**

**FOURTH SEMESTER**

**EN 010401 ENGINEERING MATHEMATICS III**

(Common to all branches)

Time : 3 Hours Maximum:100 Marks

(Answer all questions)

**Part-A**

1. What are Dirichlet conditions.
2. Find derivative of Fourier transform of f(x).
3. Solve
4. If X is uniformly distributed with mean 1 and variance 4/3, find P{X < 0}.
5. Define (i) Null hypothesis (ii) alternate hypothesis (iii) Type I and Type II errors

(5x3=15 Marks)

**Part-B**

1. Expand f (x) = x in –π <x< π as a Fourier series
2. Solve the integral equation
3. Form partial differential equation from f (x2+y2,z-xy) =0
4. If X is a Poisson variate such that

P{X=2} =9P{X=4} + 90P{X=6}, then find standard deviation.

1. A random sample of size 100 is taken from an infinite population having the

mean 2 = 256, what is the probability that will be between 75 and 78 ?

(5x5 = 25 Marks)

**Part-C**

1. Find half range cosine series of

f(x) = kx , 0 xl /2

k(l -x), l /2 x < l

Hence deduce that + …. =

**OR**

1. Compute the first two harmonics of Fourier series of f(x) given by the following table

X : 0 30 60 90 120 150 180 210 240 270 300 330

F(x) :6.824 7.976 8.026 7.204 5.676 3.674 1.764 0.552 0.262 0.904 2.492 4.736

1. (a) Find Fourier transform of exp (-a2x2 ) , a >0 and hence prove that

exp (-x2/2) is self reciprocal .

(b)Express as a Fourier sine integral.

**OR**

1. Find (i) F.C.T. of e-ax, a > 0 and hence show that =

(ii)F.S.T. of and hence show that

1. Solve
2. x(y-z) p +y(z-x)q = z(x-y)
3. (4D2 – 4 DD’+D’2) z = 16 log(x+2y)

**OR**

1. Solve
2. z2 = pqxy
3. (D3 – 7 DD’2 – 6D’3 ) z = sin (x+2y)
4. (a)An irregular six faced die is thrown and the probability of getting 5 even numbers in 10 throws is twice the probability of getting 4 even numbers. How many times in 10000 sets of 10 throws would you expect to get no even numbers?

(b)A manufacture knows from experience that the resistance of resistors he produces is normal with mean ohms and S.D. = 500 ohms. What % of resisters will have resistance (i) between 148 ohms and 152 ohms (ii) between 140 ohms & 160 ohms.

**OR**

1. (a) Fit a binomial distribution for the following data and compare the theoretical frequencies with actual one

x: 0 1 2 3 4 5

f: 2 14 20 34 22 8

(b) A car hire firm has 2 cars, which it hires out day by day. The number of demand for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate (i) proportion of days on which neither car is used and (ii) the proportion of days on which some demand is refused.

19. (a) The voltage of a source is measured 100 times and the mean voltage is found to be 220.12 V with a S.D. of 0.4V. Test the hypothesis that the mean voltage of the source is 220V at 0.05 level of significance.

(b)A form of intelligence test was given to randomly drawn samples of soldiers and sailors in a certain country is given below

No. in the sample mean score S.D.

Soldiers 332 12.78 2.43

Sailors 615 12.99 2.48

Is the difference between mean scores significant ?

**OR**

20(a) If two independent random samples of sizes 12 were observed to have Standard Deviations s1 = 0.035 and s2 = 0.062 respectively, test the hypothesis 1 2 = 2 2 against the alternative hypothesis 1 2 < 2 2 at 5% level of significance.

(b)Out of a consignment of one lakh tennis balls, 400 were selected and out of them 20 were found to be defective. How many defective balls you can reasonably expect to have in the consignment at 5% level of significance.

(12x5 = 60 Marks)