JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, October - 2020
PROBABILITY AND STATISTICS & COMPLEX VARIABLES
(Common to ME, MCT, MMT, AE, MIE, PTM)

Time: 2 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1.a) Can two events be simultaneously independent and mutually exclusive? Explain.
 b) Suppose three companies X, Y, Z produce T.V.'s. X produces twice as many as Y while Y and Z produce the same number. It is known that 2% of X, 2% of Y and 4% of Z are defective. All the T.V.'s produced are put into one shop and then one T.V. is chosen at random. Suppose a T.V. chosen is defective, what is the probability that this T.V. is produced by company X? [7+8]

2.a) Find the moment generating function of $f(x) = \frac{1}{8}(3c_x), x = 0, 1, 2, 3.$ and hence find its mean and variance.
 b) If 3 fair coins are tossed and if X is the total number of heads in the outcome. Show that X is a random variable. [7+8]

3.a) Prove that Poisson distribution is the limiting case of Binomial distribution.
 b) A distributor of bean seeds determines from extensive test that 10% of large batch of seeds will not geminate. He sells the seeds in packets of 200 and guarantees 90% germination. Determine the probability that a particular packet will violate the guarantee. [8+7]

4. Show that for normal distribution the quartile deviation, mean deviation and standard deviation are approximately 10:12:15. [15]

5.a) Discuss the test of significance procedure.
 b) A Sample of 100 electric light bulbs produced by manufactured A showed a mean life time of 1190 hours and a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer B showed a mean life time of 1230 hours with a standard deviation of 120 hours. Is there difference between the mean life times of the two brands at 0.05 level? [5+10]

6.a) In a certain city 125 men in a sample of 500 were found to be smokers. In another city, the number of smokers was 375 in a random sample of 1000. Does this indicate that there is a greater population of smokers in the second city than in the first?
 b) Weights in kg. of 10 students are given as 38, 40, 45, 53, 47, 43, 55, 48, 52, 49. Can we say that variance of the distribution of weights of all students from which the above sample was taken is equal to 20 square kg. [7+8]

7.a) If $A + iB = \tan^{-1}(x+iy)$, prove that $B = \frac{1}{4}\log\frac{x^2+(1+y)^2}{x^2+(1-y)^2}$.

 b) If $f(z) = u + iv$ is an analytic function in a region R, prove that the curves $u(x, y) = c_1, v(x, y) = c_2$ form two orthogonal families. [8+7]

8. Find the bilinear transform which maps the points $z = 0, -i, -1$ into the points $w = i, 1, 0$. Find the image of the line $y = mx$ under this transformation. [15]

---ooOoo---