UNIVERSITY OF THE PUNJAB

Seventh Semester – 2019

Examination: B.S. 4 Years Program

Roll No. in Fig. .....

Roll No. in Words. .....

.....

.....

Signature of Supdt.:

PAPER: Mathematical Statistics-I **MAX. TIME: 30 Min.**

Course Code: MATH-404 Part–I (Compulsory) **MAX. MARKS: 10**

Attempt this Paper on this Question Sheet only.
Please encircle the correct option. Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the right answer, cutting and overwriting is not allowed. (1x10=10)

(i)	For a Poisson distribution, mean and variance are related by (a) $\mu = \sigma^2$ (b) $\mu < \sigma^2$ (c) $\mu > \sigma^2$ (d) none of these
(ii)	The MGF of binomial distribution about the origin is (a) $(p+qe^t)^n$ (b) $(p+qe^t)^{-x}$ (c) $(p+qe^t)^{-n}$ (d) $(p+qe^t)^x$
(iii)	If $E(X)$ =15 and $Y = 3X - 9$, then $E(Y)$ is (a) 15 (b) 30 (c) 24 (d) 36
(iv)	The conditional probability of an event A given event B is given by (a) $P(A \cap B) = P(A)P(B\backslash A)$ (b) $P(A\backslash B) = P(A)$ (c) $P(A\backslash B) = \frac{P(A \cap B)}{P(B)}$ (d) $P(A \cup B) = P(A) + P(B)$
(v)	The probability of an event cannot be equal to (a) 0.82 (b) 0 (c) 1.35 (d) 0.36
(vi)	A discrete probability distribution may be represented by (a) a table (b) a histogram (c) a mathematical function (d) all of these
(vii)	If $M(t) = e^{-8t+24t^2}$ is the m.g.f. of a normal distribution, the mean and variance of this distribution are: (a) 8 and 48 (b) 16 and 48 (c) -8 and 48 (d) -8 and 48
(viii)	The probability of continuous random variable X at $x = a$ is (a) between 0 and 1 (b) 1 (c) 0 (d) less than 1
(ix)	The normal distribution will be less spread out when (a) the mean is small (b) the median is small
	(c) the mode is small (d) the standard deviation is small
(x)	All odd order moments of normal distribution are (a) positive (b) equal (c) 0 (d) negative

UNIVERSITY OF THE PUNJAB

Seventh Semester – 2019

Examination: B.S. 4 Years Program

Roll No. .....

PAPER: Mathematical Statistics-I

Course Code: MATH-404 Part – II

MAX. TIME: 2 Hrs. 30 Min.

MAX. MARKS: 50

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Q. 2	SHORT QUESTIONS	
(i)	Five cards are drawn from an ordinary deck of 52 playing cards. What is the probability the chosen 5 cards contain (i) Just one ace (ii) at least one ace.	(4)
(ii)	A class contains 10 boys and 20 girls of which 4 boys and 6 girls use contact lenses. If a person is selected at random from the class. What is the probability that the person selected is 'a girl' or 'a contact lens user'?	(4)
(iii)	For what value of c, the function $f(x) = c\binom{5}{x}, \quad x = 0, 1, 2, 3, 4, 5$ can be served as probability distribution function.	(4)
(iv)	Write down the Moment generating function of Poisson distribution and derive its mean and variance.	(4)
(v)	If 20% of the bolts produced by a machine are defective, determine the probability that out of 6 bolts chosen at random **(a)** less than 2 are defective **(b)** at least 4 bolts will be defective	(4)

	LONG QUESTIONS	
Q.3	Prove that the recurrence formula for the Poisson distribution is given by $\mu_{r+1} = m(r\mu_{r-1} + \frac{d\mu_r}{dm})$, where m is the parameter of the Poisson distribution.	(10)
Q.4	A continuous r.v. has PDF $f(x) = \begin{cases} k(2-x)(x-5), & 2 \le x \le 5 \\ 0, & elsewhere \end{cases}$ Find k, mean, variance, median and mode of the distribution.	(10)
Q.5	An oil company conducts a geological study that indicates that an exploratory oil well should have a 20% chance of striking oil. What is the probability that the third strike comes on the seventh well drilled? Also find the probability of three strikes when there are seven possible well drilled.	(10)