(A-5)   Seat No: _____   **No. Of Printed Pages: 4**

SARDAR PATEL UNIVERSITY
B.Sc. EXAMINATION (SEMESTER: IV)
2016
April, 25th, 2016.
Monday

Subject: Foundation of statistics - II
Subject code: USO4FSTA01

Time: 10.30 p.m. to 12.30 p.m.   **Marks: 70**

1   Multiple Choice Questions   [10]

(1) The range of the correlation coefficient is?

(a) -1 to 0   (b) 0 to 1   (c) -1 to 1   (d) None of the above

(2) A _____ tells us the amount and direction of relationship between scores.

(a) regression coefficient (b) variance (c) correlation coefficient (d) None

(3) Correlation coefficient is the ------------------- of two regression coefficients

(a) Arithmetic Mean   (b) Median   (c) Mode   (d) Geometric mean

(4) If f(x) = $\frac{e^{-2}2^x}{x!}$, x = 0,1,2,-------,∞ and zero otherwise then find P(X = 0) = ------,

(a) e^{-2} (b) e^2 (c) e/2   (d) none

(5) In Normal distribution mean, median and mode are?

(a) equal   (b) not equal   (c) not determined   (d) none

(6) Consider the following probability distribution: $f(x) = \binom{7}{x}(0.5)^7, x = 0,1,...,7$ and zero , otherwise then P(X = 3) ------- P(X = 4)

(a) =   (b) >   (c) <   (d) none

(7) 9 pairs of data yield the regression equation Y=19.4+0.93X. Predict Y for X = 42?

(a) 58.46   (b) 79.62   (c) 57.81   (d)) 64.75

(8) In the regression equation Y = 2 X + 3 , what does 3 represent?

(a) Y intercept   (b) Slope of the line
(c) Any value of the independent variable   (d) None of the above

(9) Find the area under the standard normal curve between z = 1 and z = 2.32

(a) 0.8413   (b) 0.5398   (c) 0.1485   (d) 0.1359

(10) When testing for independence in a contingency table with 3 rows and 4 columns, there are ---------- degrees of freedom.

(a) 5   (b) 6   (c) 7   (d) 12

2   Short Questions : (Attempt any TEN) : Two Marks each.   [20]

(1) List out the various methods of studying correlation. According to you, which method is considered to be best?

(2) Define correlation coefficient. State its limits and interpret them.

(3) State the equations of both the regression lines and at what point two regression lines intersect?

(4) State any three properties of regression coefficients.

(5) If X ~ N(225, 16) distribution then state mean, median, mode and standard deviation.

(6) If X ~ N(100, 100) distribution then (i) P(X < mean) (ii) P(X > 90) (iii) P(X < 80) (iv)P(X > 110) (v) P(90 < X < 110) (Use statistical table)

(P. T. O)

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(7) If mean and variance of the Binomial distribution is 5 and 5/2 respectively then find the p.m.f. of X and P(X >1).

(8) The standard deviation of Poisson distribution is 0.8. Find its mean, variance and $P(X = 2)$.

(9) State the various properties of regression coefficients?

(10) Interpret the values of p as 1, 0, and -1.

(11) Write in brief on chi square test in a 2×2 contingency table.

(12) State the conditions under which the binomial distribution tends to Poisson distribution.

3 (a) The following data pertain to the resistance (ohms) and the failure time (minutes) of certain overloaded resisters: **[5]**

Resistance	43	29	44	33	33	47	34	31	48	34	46	37
Failure time	32	20	45	35	22	46	28	26	37	33	47	30

Assuming that there is a linear relationship between the variables resistance and the failure time, calculate r and interpret the value of r.

(b) **[5]**

X	0	1	2	3	3	5	5	5	6	7	7	10
Y	96	85	82	74	95	68	76	84	58	65	75	50

find the correlation coefficient between X and Y.

OR

3 (a) Following is the data about pregnancy weights (in kg) of mothers and birth weights (in kg) of their infants. **[5]**

Mother's weight	49.4	63.5	68.0	52.2	54.4	70.3	50.8	73.9	65.8	54.4
Infant's birth wt	3.52	3.74	3.63	2.68	3.06	4.07	3.37	4.12	3.57	3.36

Calculate the correlation coefficient, r. Interpret the result.

(b) Following table gives age and vital capacity for each of 10 workers in the cadmium industry. **[5]**

Age	39	40	41	41	45	49	52	47	61	65
Vital Capacity	4.62	5.29	5.52	3.71	4.02	5.09	2.70	4.31	2.70	3.03

Calculate r, the correlation coefficient. Comment on your findings.

4 (a) Naman's parents recorded his height at various ages up to 72 months. Below is a record of the results: **[5]**

Age (months)	36	42	48	54	60	66	72
Height (in inches)	35	36	38	41	43	45	48

Calculate the height of Naman's when he was 76 months old.

(b) An instructor wants to show the students that there is a linear correlation between the number of hours they spent watching TV(X) during a certain weekend and their scores (Y) on a test taken the following Monday. The number of television viewing hours and the test scores for 10 randomly selected students are : **[5]**

Predict the score of a student who spent 4 hours to watch TV.

X	0	1	2	3	3	5	5	5	6	7
Y	96	85	82	74	95	68	76	84	58	65

4 (a) In an experiment the no .of grams of a given salt which dissolved in 100 gm of water **[6]** was observed at eight different temperatures.

Temperature(^{0}C)	0	10	20	30	40	50	60	70
Weight of salt(gm)	51.5	61.5	67.2	72.6	73.5	82.2	83.5	88.0

Predict the weight of salt which would dissolve at temperatures (i) 25^0C (ii) 35^0C.

(b) State both the regression equations. Write down the formulae for each term in the equation. **[4]**

5 (a) Only 5% of the people in a city feel that its mass transits system is adequate. If **[5]** 200 persons are selected at random, find the probability that (i) exactly 3 (ii) two or more and (iii) less than 2, will feel that the system is adequate.

(b) It was claimed that 1 out of 5 cardiologists recommend an aspirin to his patients to **[5]** prevent the hardening of arteries. Suppose that the claim is true. If 10 cardiologists are selected independently and at random. Let X be the no. of cardiologists who recommend an aspirin to his/her patients. (a) How is X distributed? (b) Give the mean and variance of X (c) Determine $P(X \geq 5)$.

5 (a) On a 12 question multiple-choice test, there are four possible answers for each **[5]** question, of which one is correct. Suppose that a student guesses on each question. Let X is the no. of correct answers. (i)How is X distributed? (ii) State its mean and variance (iii) Find $P(X = 4)$ and $P(X \geq 4)$.

(b) Suppose that the probability of suffering a side effect from a certain flu vaccine **[5]** is 0.005. If 1000 persons are inoculated, find approximately the probability that (i) *at most* 1, (ii) Exactly 2, persons suffer.

6 (a) Among females between 18 & 74 years of age, diastolic blood pressure is normally **[5]** distributed with mean $\mu = 77$ mmHg and standard deviation $\sigma = 11.6$ mmHg. What is the prob. that a randomly selected woman has a diastolic b.p (i) Less than 60 mmHg? (ii) Greater than 90 mmHg? (iii) Between 60 and 90 mmHg?

(b) 1000 families were selected at random in a city to test the belief that high income **[5]** families usually send their children to public schools and the low income families often send their children to government schools. The following results were obtained:

Income	School		Total
	Public	Govt.	
Low	370	430	800
High	130	70	200
Total	500	500	1000

Test whether income and type of schooling are independent.

6 (a) It was found that the mean length of 100 parts produced by a lathe was 20.05 mm **[5]** with a standard deviation of 0.02 mm. Find the probability that a part selected at random would have a length (i) between 20.03 mm and 20.08 mm (ii) between 20.06 mm and 20.07 mm (iii) less than 20.01 mm (iv) greater than 20.09 mm.

(P.T.O.)

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(b) The following table reveals the condition of the house and the condition of the [5] children. Is there any relation between the condition of the house and condition of the children?

Condition of children	Condition of house		Total
	Clean	Not clean	
Very clean	76	43	119
Clean	38	17	55
Dirty	25	47	72
Total	139	107	246

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