V.P. & R.P.T.P. Science College, Vallabh Vidyanagar
B.Sc. Semester- IV
Internal Test
Time: 10.30 to 11.30 a.m.   **Foundation of Statistics - II**
Date: 12th March, 2015   Course Code: US04FSTA01   Marks: 25
Note: (i) Statistical table will be allowed/provided on request.   (ii) Q.3 to Q.5 have 6 marks.

Q.1   Multiple Choice Questions (3×1)

(1)   In the regression $Y = 4X + 2$, what does the 4 represent?
　　　(a) Y intercept   (b) Slope of the line
　　　(c) Any value of the independent variable that is selected   (d) None of the above

(2)   Consider the following probability distribution: $P(x) = \binom{5}{x}(0.2)^x(0.8)^{5-x}, x = 0, 1, \ldots, 5$
　　　Find the standard deviation of the random variable X.
　　　(a) 0.16   (b) 1.00   (c) 0.8   (d) 0.89

(3)   When testing for independence in a contingency table with 3 rows and 3 columns, there are _____ degrees of freedom.
　　　(a) 2   (b) 4   (c) 6   (d) 8

Q.2   Short Type Questions (Attempt Any Two) (2×2)

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

(2)   The number of arrivals per minute at DMART is Poisson distributed with a mean of 2 arrivals/minute. What is the probability that less than five arrivals occur in a minute?

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

Q.3   An experiment is carried out at different temperatures dissolving 100 gm of salt in 100 ml of water. The results are as under.

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

(i) Identify an independent and dependent variable (ii) Is there any relationship between these two variables? Justify your answer by calculating most suitable statistical measure (iii) Predict the weight of salt at 22^{0}C.

OR

Q.3   What is Regression? Write down the regression equations of X on Y and Y on X. State its uses.
Following table gives age and vital capacity for each of 12 workers in the cadmium industry.

Age	39	40	41	41	45	49	52	47	61	65	58	59
Vital Capacity	4.62	5.29	5.52	3.71	4.02	5.09	2.70	4.31	2.70	3.03	2.73	3.67

Estimate the vital capacity of a worker whose age is 50 years.

Q.4(a)   A test consists of 10 multiple choice questions, each with four possible answers, one of which is correct. To pass the test a student must get 40% or better on the test. If a student randomly guesses, what is the probability that the student will pass the test?

(b)   The probability that a patient will get reaction of a temiflu injection is 0.001. If 5000 patients are given that injection. Find the probabilities that (i) Exactly 3 (ii) more than 2, patients will get reaction.

OR

Q.4(a)   Let X be a Poisson variate with variance 2. Determine the following probabilities:
$(i) P(X < 2)$ $(ii) P(X = 3)$ $(iii) P(X > 4)$

(b)   It was claimed that 1 out of 3 cardiologists recommend an aspirin to his patients to prevent the hardening of arteries. Suppose that the claim is true. If 15 cardiologists are selected independently and at random. Let X be the no. of cardiologists who recommend an aspirin to his/her patients (i) How is X distributed? (ii) Give the mean and standard deviation of X (iii) Determine $P(X \geq 2)$.

Q.5   One thousand families were selected at random in a city to test the belief that high income 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	
	Public	Govt.
Low	370	430
High	130	70

Test whether income and type of schooling are independent.

OR

Q.5   From the following data find out whether there is any relationship (association) between sex and preference of colour.

Colour	Sex	
	Male	Female
Red	10	40
White	70	30
Green	30	20