

P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination

November 2019

SESH3750 Solution to Real World Problems: A Mathematical Approach

29.11.2019, Friday

Time: 09:00 a.m. To 11:30 a.m.

Maximum Marks: 60

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of a scientific calculator is allowed.

SECTION - I

Q - 1 Attempt the following (Any Five):

[05]

- (i) Define linear regression.
- (ii) Write any four types of data interpretation.
- (iii) What is caselet form?
- (iv) Define regression.
- (v) Write types of seating arrangements.
- (vi) What is the coefficient of correlation?
- (vii) Define logistic regression.

Q - 2 (a) The following table shows the number of hours each student spent studying, and whether they passed (1) or failed (0). Give the probability of a student who study 1 hour and 2 hours for exam by Logistic regression respectively.

[05]

Hours	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
Pass	0	0	0	0	0	1	0	1	0	1	0

Q - 2 (b) From the following data, obtain two lines of regression and the coefficient of correlation.

[05]

x	6	2	10	4	8
y	9	11	5	8	7

OR

Q - 2 (a) Discuss Bar graph in detail.

[05]

Q - 2 (b) Read the following passage carefully and answer the questions given below it.

[05]

Eight friends A, B, C, D, E, F, G and H are seated in a row facing north. There are exactly two persons sitting to the left of B. Three persons sit between A and H, and neither of A nor H is a neighbour of B. C sits to the 3rd left of A. Only one person is sitting between D and F, and none of them is sitting in a corner seat. G is a neighbour of F.

1. Who is sitting at the extreme right end?
2. How many persons sit between G and C?
3. Which is a neighbour of A?
4. Who is sitting to the immediate left of E?
5. What is F's position with respect to C?

Q - 3 (a) The following table gives the enrollment in Higher Secondary Schools in 1978. Study the table carefully and answer the following questions.

[05]

Enrollment	20-39	40-59	60-79	80-99	100-119	120-139	140-159	160-179	180-199
No. of Schools	526	620	674	717	681	612	540	517	522

1. What is the approximate percentage of schools, where the enrollment was below 120?
2. What is the approximate percentage of schools, where the enrollment was above 79 but

below 180?

3. Under which class does the maximum number of schools fall?
4. What is the approximate percentage of the least number of schools for the classes of enrollment?
5. What is the number of schools where the enrollment is above 99 but below 160?

Q - 3 (b) In a partially destroyed laboratory record for analyzing correlation data, only following results are left: [05]

Regression lines are: $4x - 5y + 33 = 0$ and $20x - 9y = 107$.

From the above information, determine (i) mean values of x and y .

and (ii) coefficient of correlation between x and y .

OR

Q - 3 (a) K, L, M, P, Q, R, S and T are seated around a square table in such a way that four of them sit at four corners of the square while four sit in the middle of each of the four sides. The one who sits at the four corners faces outside while those who sit in the middle of the sides face the center of the table. P sits third to the right of the S. S faces the center. Q sits third to the right of M who doesn't sit in the middle of the sides. Only one person sits between Q & R. R is not an immediate neighbour of M. T faces the center. K is not an immediate neighbour of R. [05]

1. What is the position of M with respect to L?
2. Who sits exactly between Q & R?
3. Who sits between R & K when counted in anti-clockwise direction from K?
4. If K faces the opposite direction, who would sit to his immediate right?
5. Which of the following pairs represents the persons seated in the center of the side who face each other?

i) S, Q ii) K, L iii) M, P iv) R, T v) T, Q

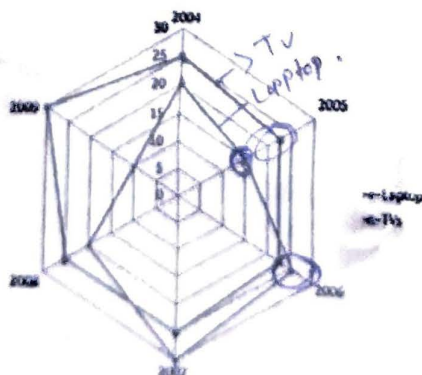
Q - 3 (b) Given the following data:

x	1	5	3	2	1	1	7	3
y	6	1	0	0	1	2	1	5

1. Fit a regression line of y on x and predict y when $x=5$.
2. Fit a regression line of x on y and predict x when $y=2.5$.
3. Calculate Karl Pearson's coefficient of correlation.

Q - 4 Attempt the following (Any One):

(i) In the question below, the sales of TV and laptop in the subsequent years from 2004 to 2009 are given. The figures are in million. Based on the figure answer the questions below. [05]



1. How many times do the sales of a laptop less than the TV in the given years?
2. Find the ratio of the total number of televisions sold to the total number of laptops sold in all these years.
3. For which year and which item shows the highest percentage increase in the sales in the previous year?
4. For the data series shown in the figure, how many years have shown the decrease in sales for both the items in the same year?
5. Which year shows the highest percentage decrease in the total sales of the two items?

- (ii) It is a very known fact the growth of hotels is driven by the increase in the number of people that are using the hotels. In 2014, it is expected that there will be 20 crore hotel users in Spain or about 20% of the population will generate Rs. 50 billion as hotel revenues. It is also believed that the revenues in the industry should expand from Rs. 50 billion to Rs. 150 billion by 2018, while the number of users should grow to over 56 crore or to about half the population of Spain in the same duration.

1. What is the estimated population of Spain in 2014?
2. What will be the average growth rate of the population of Spain from the given period 2014 – 2018?
3. Find the actual growth in the percentage of users in Spain by 2018?
4. It is believed that if the 50 % the population of any country can afford the hotel-use, then it is considered as economically developed. Based on the belief can we determine whether Spain will be an economically developed country by 2017?
5. In the given time period, what will be the growth of the hotel industry?

SECTION – II

Q - 1 Attempt the following (Any Five):

- (i) Simple interest is calculated by the formula [05]
 (a) $\frac{P \times R \times T}{100}$ (b) $\frac{P}{R \times T} \times 100$ (c) $\frac{P \times R}{T} \times 100$ (d) $\frac{R \times T}{P} \times 100$
- (ii) Banking system mainly uses
 (a) Simple interest system (b) compound interest system
 (c) Simple – compound interest system (d) none of the above
- (iii) What is a mutual fund?
- (iv) The principal amount with compound interest is calculated by
 (a) $A = P(1 + R/100)$ (b) $A = P^n(1 + R/100)$
 (c) $A = P(1 + R/100)^n$ (d) $A = P(1 + R/100)$
- (v) Write a quick math method for multiplication of any two digit numbers with an illustration.
- (vi) Which of the following is **NOT** an account type?
 (a) Savings (b) Current (c) Mutual Fund (d) Recurring
- (vii) ATMs allow
 (a) 5 Transactions in METRO cities
 (b) 8 total transactions
 (c) 5 Transactions in non-metro cities and 3 in METRO cities
 (d) do not charge any money for transaction limit exceeded.

Q - 2 (a) If the sum of the sides of a right triangle is 49 inches and the hypotenuse is 41 inches, find the two sides. [05]

Q - 2 (b) Discuss about a fixed deposit in detail. [05]

OR

Q - 2 (a) If the height of a triangle is 5 inches less than the length of its base, and if the area of the triangle is 52 square inches, find the base and the height. [05]

Q - 2 (b) Discuss about a mutual fund in detail. [05]

Q - 3 (a) A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Rs. 1600 each on 1st January and 1st July of a year. At the end of the year, find the amount he gained by way of interest. [05]

Q - 3 (b) Simple interest on a certain sum of money for 4 years at 5% per annum is half the compound interest on Rs. 3000 for 2 years at 10% per annum. Find the sum placed on [05]

simple interest.

OR

- Q - 3 (a)** Write a note on types of deposit accounts. [05]
- Q - 3 (b)** The market price of a chair was Rs. 1200. This price was 20% above the cost price. It was sold at a discount of 10% on the marked price. Find the profit percent. [05]
- Q - 4** Attempt the following (Any one): [05]
- (i)** A manufacturer makes a profit of 15% by selling electronic iron for Rs. 6900. If the cost of manufacturing increases by 30% and the price paid by the retailer is increased by 20%, find the profit percentage made by the manufacturer.
- (ii)** The MRP of the product is given as Rs. 2000 and the merchant decides to provide successive discounts of 30% and 20% on the product. Find the selling price.
- (vii)** Write quick math method for multiplication of two digit numbers with an illustration.
