2016

DDE

M.Com. Part–I Examination

QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS

PAPER—II

Full Marks : 100

Time : 4 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Write the answer question of each Half in separate books.

First Half

(*Business Statistics*)

[Marks : 50]

Answer *Q. No. 1* and any *two* from the rest.

1. Answer any *four* questions of the following : 4×5

(a) Indicate the correct answer :

(A) If the correlation co-efficient between x and y is – 0·42, the correlation co-efficient between 2 + 0·5x and

0·3 – 1·8y is

(i) – 0·42 ; (ii) + 0·42 ; (iii) + 0 21 ; (iv) none of these.

(B) If two variables are linearly related the coefficient of correlation between them will be :
(i) 0 ; (ii) + 1 ; (iii) – 1 ; (iv) ± 1.

(C) If the co-efficient of correlation between two variables is 0, the angle between the two regression lives will be :
(i) 0° ; (ii) 90° (iii) 45° (iv) 180°.

(D) Let the regression coefficient be devoted by b_1 and b_2 and the correlation coefficient be devoted by r. Then the relation between them will be :

(i) $\frac{b_1 + b_2}{1} \geq r$; (ii) $\frac{|b_1|(b_2)}{2} \geq r$;

(iii) $\frac{b_1 + |b_2|}{2} \geq r$ (iv) $\frac{|b_1| + |b_2|}{2} \geq (r)$.

(E) If the product moment coefficient of correlation between x and y be 0·73, the rank correlation coefficient between x and y :
(i) can not be determined ;
(ii) Must be 0·73 ;
(iii) May be different from 0·73 ;
(iv) Must be different from 0·73.

(b) Given the following information :
$f_A = 490$, $f_{AB} = 294$, $f_\alpha = 570$, $f\,\alpha\,\beta = 380$, establish the nature of association between the attributes A and B.

(c) If the wages of a group of workmen are increased by 40% and the cost of living rises by 25%, how much greater is their purchasing power than before the change took place ?

(d) In the context of the two variable linear regression on analysis establish the relation $S^2y \cdot x = S^2y\left(1 = r^2\right)$, all the symbols have the usual meaning. Hence interpret the cases (i) $r = 0$ and $r = \pm 1$.

(e) What is you mean by "business forecasting" ? Indicate its uses .

(f) Show that both Laspeyre's and Paasche's price index numbers may be regarded as weighted averages of price relatives. Specially the weight in each case.

(g) Name the publication that present trade statistics in India. Name the Government bodies that publish them and add a note on their adequacy.

(h) Define an Index number. Example clearly the various steps involved in the construction of an index number.

2. (a) From the following information, fit a straight line equation and estimate the number of tourists in India in the year 2017-18 :

year :	2010-11	2011-12	2012-13	2013-14	2014-15
Number of tourists (lakhs)	05	08	07	09	12

(b) A company estimates its sales for a particular year to be ₹ 24,00,000. The seasonal indices for the sales are as follows :

Month	*Seasonal Index*	*Month*	*Seasonal Index*
January	75	July	102
February	80	August	104
March	98	September	100
April	128	October	102
May	137	November	82
June	119	December	73

Using this information, calculate estimated monthly sales of the company. Assume there in no trend.

(8+2)+5

3. (a) Show that Fishers Price Index formula lies between Laspeyer's and Paaschee's Price Index formulae.

(b) In calculating cost of living index number the weights used were : Food 10, Rent 2, clothing 5, Fuel and Light 2 and Miscellaneous 1. Calculate the index number in the case of data where the percentage increases in the prices of the various items in 2015 over the prices of 2010 were 40, 75, 60, 35 and 80 respectively.

(c) Calculate chain base index number from the following data :

Year	*Production ('000 Kwt.)*
2010	25
2011	27
2012	30
2013	24
2014	28
2015	31

4. (a) Derive Newton's Forward intepolation formula and state the suitable application areas of it.

(b) By using a suitable method ascertain the value of y when x = 5 from the following data :

x :	2	3	4	6	7
y :	1	5	13	61	125

7+8

5. (a) Show that corelation coefficient (r) lies between –1 and + 1.

(b) The equations of two regression lines in a correlation and analysis are as follows :

$3x + 2y = 26$ and $6x + y = 31$

A student obtains the mean values $\bar{x} = 7, \bar{y} = 4$ and value of correlation co-efficient r = + 0·5. Do you agree with him ? If not, suggest your results.

Second Half

(Quantitative Techniques for Managerial Decisions)

[Marks : 50]

Answer *Q. No. 6* and any *two* from the rest.

6. Answer any *four* of the following : 4×5

(a) Define Operations Research and highlight its major contributions and limitations in the context of managerial decision-making. $2+1\frac{1}{2}+1\frac{1}{2}$

(b) How does the problem of degeneracy arise in a transportation problem ? How can such degeneracy be removed ?

(c) Choose the correct answer with reason and explain the correct answer graphically :
"At EOQ-level, (i) the ordering cost and carrying cost are equal, (ii) the ordering cost is more than carrying cost, (iii) the carrying cost is more than ordering cost, (iv) the ordering cost and carrying cost are not related in any way'.

(d) What is critical path in a network ? Will crashing of activities not lying on the critical path reduce project completion time ? Give reasons for your answer.

(e) Graphically solve the following linear programming problem :

Max $Z = 4x_1 + 8x_2$

Subject to : $2x_1 + x_2 \leq 30$

$x_1 + 2x_2 \leq 50$

(Note : Use manually drawn graph paper).

(f) What is a Queuing problem ? Briefly explain the following terms commonly used in queuing theory : customer, waiting time, queue length, queuing system.

(g) What do you understand by the terms 'direct cost' and 'indirect cost' in PERT ? How do they behave in project cost ? 3+2

(h) What is 'traffic intensity' in queuing ? What happens to the queue length when traffic intensity is (i) less than 1, (ii) equal to 1, and (iii) greater than 1 ?

7. (a) At the cash counter of the Directorate of Distance Education, students arrive in a poission process with an average time of 3 minutes between arrivals. The time intervals between services at the cash counter follow exponential distribution and as such the mean time taken to provide services to a student is 2

minutes. On the basis of this information you are to answer the following :

(i) What should be the expected average queue length ?

(ii) What would be the average number of students in the queuing system ?

(iii) How long an average student would have to wait in the queue ?

(iv) How much time an average student would have to spend in the system ?

(b) A company uses 2,500 units of a component having a constant usage rate annually which it purchases from an outside supplier under the following terms :

Order Quantity	*Price per unit (Rs.)*
0 – 499	5·00
500 – 2499	4·75
2500 or more	4·50

The ordering cost is Rs.100 per order and the holding cost is 10% per year. Calculate EOQ and the corresponding annual inventory cost. 8+7

8. (a) An Airline operating seven days a week, serves two cities : Bangalore and Hyderabad. It follows the time table given below :

Flight No.	*Bangalore-Hyderabad*		*Flight No.*	*Hyderabad-Bangalore*	
	Depart.	*Arrive*		*Depart.*	*Arrive*
01	06.00	08.00	05	08.00	10.00
02	10.00	12.00	06	11.00	13.00
03	14.00	16.00	07	15.00	17.00
04	19.00	21.00	08	23.00	01.00

Crews must have a least 5 hours of layover time before starting a second flight. A crew will be stationed in a city that result in a smaller layover. Find the pairing of flights that minimises total layover period away from station and also suggest the planning for stationing the crew.

(b) How would you solve an assignment problem in case multiple assignments are required ?

12+3

9. (a) Three products - A, B, and C have to be processed by three machines M_1, M_2, and M_3. Available machine hours for the three machines, machine hour requirements per unit of each product and profit per unit of each product and given by the following table :

Machines	*Machine hour requirements per unit*			*Available Hours*
	Product A	*Product B*	*Product C*	
M_1	1	1	1	100
M_2	10	4	5	600
M_3	2	2	6	300
Profit per unit (Rs.)	100	60	40	

Write down the complete linear programming formulation of the problem and determine the optimum feasible solution.

(b) Write the dual of the following liner programming problem :

Maximise $Z = 3x_1 + 4x_2 + 7x_3$

Subject to : $x_1 + x_2 + x3 \leq 10$

$4x_1 - x_2 - x_3 \geq 15$

$x_1 + x_2 + x_3 = 7$

When x_1, x_2, and $x_3 \geq 0$.

(2+9)+4

10. The following table gives the activities and other relevant data for a project.

Activity	*Normal Time (days)*	*Crash Time (days)*	*Normal Cost (Rs.)*	*Crash Cost (Rs.)*
1-2	4	3	600	800
1-3	2	2	400	400
1-4	5	4	750	900
2-3	7	5	400	600
2-5	7	6	800	1000
3-5	2	1	500	650
4-5	5	4	600	850

Indirect cost per day for the project is Rs.200.

(a) Draw a network of the project.

(b) Find the normal duration and cost of the project.

(c) Find the optimum duration and cost of the project.

2+3+10

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