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# AAF-603-N

Seat No. 1367

## B. C. A. (Sem. III) Examination

### October / November – 2016

## 303 : Statistics & Optimization Technique

Time : 3 Hours] [Total Marks : 70

1 (a) Answer the following questions : 8

(1) The mean of a series of 36 observations is 18.7 then find the sum of observations _____.

(2) 50% of the observation of a series are more than 32. Its median is _____.

(3) List out the measures of dispersion.

(4) $Z - M = 4$ and $Z + M = 60$ then find $\bar{x} =$ _____.

(5) The variance of 25 observations is 1.69 then S.D. is _____.

(6) Write down two examples of a discrete variable.

(7) The value of S.D. is always _____.

(8) Define median.

(b) Attempt any two : 10

(1) Find Mean, Median and Mode :

| *Observation* | 1 | 2 | 5 | 6 – 10 | 10 – 20 | 20 – 30 | 30 – 50 | 50 – 70 | 70 – 100 |
|---|---|---|---|---|---|---|---|---|---|
| *Frequency* | 3 | 4 | 10 | 23 | 20 | 20 | 15 | 3 | 2 |

(2) Calculate the standard deviation for the following data :

| *Observation* | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 |
|---|---|---|---|---|---|---|---|---|
| *Frequency* | 14 | 40 | 54 | 46 | 26 | 12 | 06 | 02 |

(c) The mean and standard deviations of observations of (17) items are 25 and 5 respectively; while calculating these measures, a measurement 53 was wrongly read as 35, correct this error and find out the correct standard deviations.

2 (a) (1) Define : Correlation. 1

(2) If $r = 0$ then two variables are _____. 1

(3) Two regression lines intersect each other at _____, _____. 1

(4) If rank correlation $r = +1$ then $\sum d^2 =$ _____. 1

(5) Correlation between income and expenditure is termed as _____ correlation. 1

(6) If one regression coefficient is 0.3 and correlation coefficient is 0.9 then find other regression coefficient. 2

(b) Attempt any two : 10

(1) Find the correlation coefficient between x and y by Karl Pearson's method :

| $x$ | 100 | 101 | 102 | 100 | 99 | 97 | 98 | 96 | 95 |
|---|---|---|---|---|---|---|---|---|---|
| $y$ | 98 | 99 | 99 | 95 | 92 | 95 | 94 | 90 | 91 |

(2) The rank correlation coefficient between ranks in English and Economics of 10 students is 0.5; it was later on observed as the difference in rank of one student was taken as 3 instead of 7 then find correct value of rank correlation coefficient.

(3) From the following data obtain the two regression equations.

| $x$ | 0 | 20 | 40 | 60 | 80 |
|---|---|---|---|---|---|
| $y$ | 54 | 65 | 75 | 85 | 96 |

3 (a) Answer the following :

(1) Explain the difference between PERT and CPM. **3**

(2) Explain slack and surplus variable. **3**

(3) Explain the following terms : **2**

(i) Activity

(ii) Event

(b) Attempt any two : **10**

(1) Use the Simplex method to solve the following L.P.P.

Maximize $Z = 2x_1 + 3x_2$

Sub. to $-x_1 + 2x_2 \leq 4$

$x_1 + x_2 \leq 6$

$x_1 + 3x_2 \leq 9$

and $x_1, x_2 \geq 0$.

(2) Solve the following L.P.P. using graphical method.

Max. $Z = 6x_1 + 8x_2$

Sub. to $5x_1 + 10x_2 \leq 60$

$4x_1 + 4x_2 \leq 40$

and $x_1, x_2 \geq 0$.

(3) Draw a network diagram for the following activity :

| Activity | $A$ | $B$ | $C$ | $D$ | $E$ | $F$ | $G$ |
|---|---|---|---|---|---|---|---|
| Predecessor Activity | – | – | $A$ | $A, B$ | $C, D$ | $C, D$ | $E, F$ |

4 (a) Answer the following :

(1) How assignment problem is a particular case of transportation problem ? **3**

(2) What is unbalanced transportation problem ? How can it be balanced ? **4**

(b) Attempt any two : **10**

(1) Obtain initial basic feasible solution for the given problem by NWCM, LCM and VAM.

| | $x$ | $y$ | $z$ | *Supply* |
|---|---|---|---|---|
| $A$ | 3 | 7 | 1 | 20 |
| $B$ | 2 | 9 | 12 | 30 |
| $C$ | 10 | 2 | 5 | 50 |
| *Demand* | 35 | 15 | 50 | |

(2) Find optimal solution.

| | $D_1$ | $D_2$ | $D_3$ | $D_4$ | *Supply* |
|---|---|---|---|---|---|
| $S_1$ | 19 | 30 | 50 | 10 | 7 |
| $S_2$ | 70 | 30 | 40 | 60 | 9 |
| $S_3$ | 40 | 8 | 70 | 20 | 18 |
| *Demand* | 5 | 8 | 7 | 14 | 34 |

(3) Determine the optimal assignment schedule for the following problem.

Jobs

| Person | $A$ | $B$ | $C$ |
|---|---|---|---|
| 1 | 120 | 100 | 80 |
| 2 | 80 | 90 | 110 |
| 3 | 110 | 140 | 120 |