BRAINWARE UNIVERSITY

Course – BSc(CS)

Mathematics II (BCSC203)

(Semester – 2)

Time allotted: 3 Hours **Full Marks: 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question) 10 x 1 = 10

1. Choose the correct alternative for the following : (*Any ten)*

(i) A spanning tree of a graph with n vertices must have

a) At least n-1vertices
b) At most n-1 vertices
c) Exactly n-1 vertices
d) None of these

(ii) If A and B are two mutually exclusive events then

a) $P(A+B) = 0$
b) $P(AB) = 0$
c) $P(A+B) \neq 0$
d) $P(AB) \neq 0$

(iii) A list of 5 pulse rates are: 70, 64, 80, 74 and 92. What is the median for this list?

a) 64
b) 74
c) 70
d) 80

(iv) The mean of a distribution is 23, the median is 24. What will be the mode of this distribution?

a) 26
b) 21
c) 24
d) 28

(v) A connected graph T without any cycle is called _____

a) Simple graph
b) Tree
c) Complete graph
d) Multi graph

P.T.O.

(vi) Two unbiased coins are tossed. What is the probability of getting at most one tail?

a) 1/2 c) 2/3
b) 3/4 d) 1/3

(vii) A graph with n vertices will definitely have a parallel edge or self-loop if the total number of edges are

a) Greater than n–1 c) Less than n(n–1)
b) Greater than n(n–1)/2 d) Less than n/2

(viii) In how many ways can a hungry student choose 3 toppings for his prize from a list of 10 delicious possibilities?

a) 100 c) 120
b) 150 d) 180

(ix) In an undirected graph, the number of nodes with odd degree must be

a) Zero c) Odd
b) Prime d) Even

(x) The total number of ways of distributing n distinct objects into r compartment marked $1,2,\ldots,r$ is

a) n^r c) r^n
b) ${}^nC_r$ d) ${}^nP_r$

(xi) The mean of first n natural numbers is

a) (n+1)/2 c) n(n+1)/2
b) (n-1)/2 d) n(n-1)/2

Group – B

(Short Answer Type Question) 3 x 5 = 15

Answer *any three* questions of the following

2. The mean age of a group of 100 children was 9 years. The mean age of 25 of them was 8 years and that of another 65 was 10 years. What was the mean age of the remaining children?

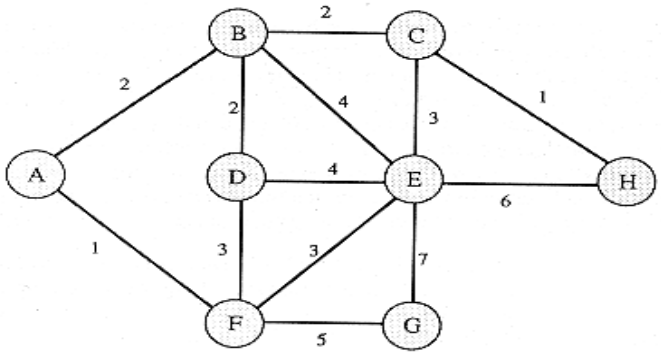
3. Find the mean deviation of the following series:

x	10	11	12	13	14	Total
Frequency	3	12	18	12	3	48

4. If A and B stand in a line at random with 10 other people, what is the probability that there are 3 people between A and B?

5. The probability that an entering college student will be a graduate is 0.4. Determine the probability that out of 5 entering student (i) none (ii) at least one will be a graduate?

6. Use Kruskal's algorithm to find the minimal spanning tree of the following graph



Group – C

(Long Answer Type Question) 3 x 15 = 45

Answer *any three* questions of the following

7. (a). State Bayes' Theorem.

   (b). Two boxes contain respectively 4 white and 2 black balls and 1 white and 3 black balls. One ball is transferred from the first box into the second, and the one ball is drawn from the second box. It turns out to be black. What is the probability that the transferred ball was white?

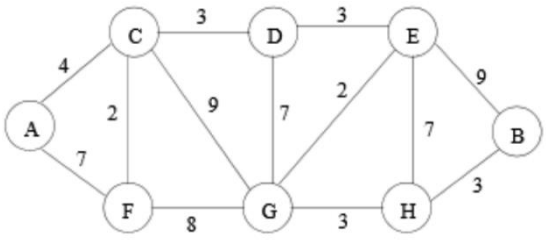
   (c). Calculate the standard deviation from the following frequency distribution.

Wages	50-65	65-80	80-95	95-110	110-125	125-140
No. of workers	16	10	20	30	20	10

[3 + 5 + 7]

8. (a). Two samples of sizes 60 and 90 have 52 and 48 as their respective arithmetic means, and 9 and 12 as the respective standard deviations. Find the arithmetic mean and standard deviations of the combined sample of size 150?

   (b). Use Dijkstra's algorithm to find the shortest path between A and B.



[6 + 9]

9. Compute the arithmetic mean and median of the following distribution:

Monthly income (Rs.)	0-75	75-150	150-225	225-300	300-375	375-450
Frequency	15	200	250	225	10	5

[8 + 7]

10. (a). An incomplete frequency distribution is given below:

Height	5.1-6.0	6.1-7.0	7.1-8.0	8.1-9.0	9.1-10.0	10.1-11.0	11.1-12.0
No. of Plants	3	8	27	?	17	11	9

If the median height of the plant is 8.53 inches then calculate the missing frequency.

[8 + 7]

(b). One urn contains 2 white and 2 black balls and a second urn contains 2 white and 4 black balls. (i) If one ball is chosen from each urn what is the probability that they will be of the same color? (ii) If an urn is selected at random and one ball is drawn from it, what is the probability that it will be a white ball?

[9 + 6]

11. (a). Calculate the quartile deviation and its coefficient from the following:

C.I.	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Frequency	4	12	16	22	10	8	6	4

(b). Prove the following inequality:

i) $P(A+B) \leq P(A) + P(B)$

ii) $P(AB) \geq P(A) + P(B) - 1$

[9 + (3 + 3)]