BRAINWARE UNIVERSITY

Course – BSc(CS)

Mathematics II (BCS203 / 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 Questions) 10 x 1 = 10

1. *Choose the correct alternative from the following :*
(i) The relation between first, second and third quartiles are
    a. $Q_1 > Q_2 > Q_3$ b. $Q_1 \geq Q_2 \geq Q_3$
    c. $Q_1 < Q_2 < Q_3$ d. $Q_1 \leq Q_2 \leq Q_3$

(ii) Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 4 or 5?
    a. 1/2   b. 8/15
    c. 2/5   d. 9/20

(iii) What is chromatic number of a complete bipartite graph with n vertices?
    a. 1   b. 2
    c. n   d. n-1

(iv) If P(A)=1/3, P(B)=2/3 and P(AB)=1/4 then P(A+B)=?
    a. 1/2   b. 1
    c. 3/4   d. 5/12

(v) What is the number of region of a connected graph containing 6 vertices and 7 edges?
    a. 15   b. 3
    c. 1   d. 11

(vi) What is the mean deviation of the values 15, 12 and 18?
    a. 6   b. 0
    c. 3   d. 2

(vii) What is the relation between A.M., G.M. and H.M.?

    a. A.M $\leq$ G.M. $\leq$ H.M.   b. A.M. $<$ G.M. $<$ H.M.

    c. A.M. $\geq$ G.M. $\geq$ H.M.   d. A.M. $>$ G.M. $>$ H.M.

(viii) For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is true?

    a. v = e   b. v = e+1

    c. v+1 = e   d. None of these

(ix) Three unbiased coins are tossed, what is the probability of getting at least 2 tails ?

    a. 1/3   b. 1/6

    c. 1/2   d. 1/8

(x) What is the variance of a constant?

    a. Zero   b. Constant

    c. One   d. None of these

Group – B

(Short Answer Type Questions)   3 x 5 = 15

Answer any *three* from the following:
2. What is clique? Define maximal clique.   [3+2]
3. A bag contains 8 red and 5 white balls. Two successive draws of 3 balls are made without replacement. Find the probability that the first drawing will give 3 white balls and the second 3 red balls?   [5]
4. The geometric mean of 4 observations is 47 and the geometric mean of 6 others is 40. Find the geometric mean of all the 10 observations.   [5]
5. What is edge covering? Give an example.   [3+2]
6. If events A and B are independent, prove that A^c and B^c are also independent.   [5]

Group – C

(Long Answer Type Questions) 3 x 15 = 45

Answer any *three* from the following:

7. (a) For a distribution of 280 observations mean and standard deviation were found to be 54 and 3 respectively. On checking it was discovered that two observations, which should correctly read as 62 and 82, had been wrongly recorded as 64 and 80 respectively. Calculate the correct values of mean and standard deviation. [7]

   (b) If $P(A) = 1/2$, $P(B) = 1/3$, $P(AB) = 1/4$ then

   i. find the following probabilities:
      $P(A^C)$, $P(A + B)$, $P(A / B)$, $P(A^C B)$, $P(A^C B^C)$, $P(A^C + B)$

   ii. State whether the event A and B are mutually exclusive, exhaustive, equally likely and independent. [6+2]

8. (a) Calculate the quartile deviation from the following frequency distribution.

Class Interval	130-134	135-139	140-144	145-149	150-154	155-159	160-164
Freq.	5	15	28	24	17	10	1
   [10]

   (b) 12 distinguishable balls are distributed at random into 4 boxes. What is the probability that a specified box contains exactly 3 balls? [5]

9. (a) State and prove Baye's theorem. [10]
   (b) Define chromatic partitioning. Give an example. [3+2]

10. (a) The frequency distribution of expenditure of 1000 families is given below:

Expenditure (Rs.)	40-59	60-79	80-99	100-119	120-139
No. of families	50	F_1	500	F_2	50
   [8]

   The mean and median of the distribution are both Rs. 87.50. Determine the missing frequencies.

(b) Find the shortest path from v_1 to v_6 of the following graph using Dijkstra's algorithm. [7]
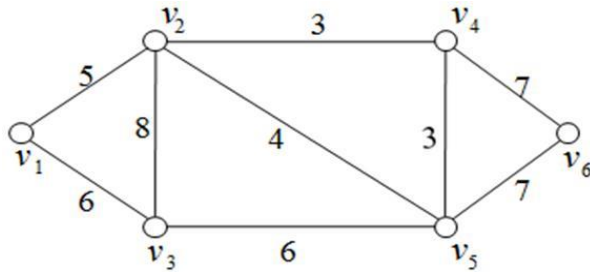
11. (a) The average monthly income of the workers in a factory is Rs. 520 and the average monthly income of male workers and female workers are Rs. 540 and Rs. 460 respectively, find the percentage of male workers and female workers in the factory. [5]

(b) Five men in a company of 20 people are graduates. If 3 men are picked out of the 20 at random, what is the probability that they are all graduates? What is the probability of at least one graduate? [6]

(c) In 1980, mean and variance production of steel factory A are 100 and 16 respectively and those of factory B are 200 and 36 respectively. Find which factory of them is more consistent in production of steel in 1980. [4]