

PARUL UNIVERSITY
FACULTY OF COMMERCE
B.Com.(Hons) Winter 2018 – 19 Examination

Semester: 1

Subject Code: 16100106

Subject Name: Business Maths

Date: 08/12/2018

Time: 10.30 am to 1.00 pm

Total Marks: 60

Instructions:

- All questions are compulsory.
- Figures to the right indicate full marks.
- Make suitable assumptions wherever necessary.
- Start new question on new page.

Q.1 Do as directed.**A) Chose the most appropriate answer from the given options.****(06)**1. For which of the following matrices $tr(A) \neq 3$?

a) $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 2 & -3 & -3 \end{bmatrix}$

b) $\begin{bmatrix} 2 & 0 & -3 \\ 3 & -4 & -1 \\ 2 & 10 & 5 \end{bmatrix}$

c) $\begin{bmatrix} 0 & 1 & 3 \\ 1 & 3 & 0 \\ 0 & 3 & 1 \end{bmatrix}$

d) $\begin{bmatrix} 10 & 9 & 8 \\ -7 & -6 & -5 \\ 3 & -2 & -1 \end{bmatrix}$

2. Which of the following is an example of a skew-symmetric?

a) I

b) $A + A^T$

c) $A - A^T$

d) All of them

3. Which of the following is a singular matrix.?

a) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

4. Two events A and B are independent then $p(A \cup B) =$ _____

a) $p(A)p(B)$

b) $p(A) + p(B)$

c) $p(A) + p(B) - p(A)p(B)$

d) 0

5. For two mutually exclusive and exhaustive events A and B, which of the following is not true?

a) $p(A \cup B)' = 0$

b) $p(A \cap B) = 0$

c) $p(A \cup B) = p(A) + p(B)$

d) $p(A') = p(B') = 0$

6. For any event A in a random experiment, $p(A \cap A')$ is _____.

a) *always 0*

b) *always non – zero*

c) *never 0*

d) *a certain event*

B) Do as directed.**(06)**

1. Write down the first five terms of the AP with first term 8 and common difference 7

2. Find the sum of the first five terms of the GP with first term 3 and common ratio 2.

3. Define singleton set.

4. Give an example of a singular matrix which is symmetric as well as skew-symmetric.

5. $P(A) = \frac{1}{3}$, $P(\bar{A} \cap B) = \frac{1}{6}$ and $P(A \cap B) = \frac{1}{3}$ then $P(B) =$ _____6. $P(A) = 0.2$, $P(B) = 0.4$ and $P(A \cup B) = 0.8$ then A and B are mutually exclusive events. [True/False]**Q.2 Answer the following. (Each of 04 Marks)****(12)**

1. Define cardinality of a set.

Let $A = \{a, \{b, c\}, d\}$ then find the cardinality of A. Also find power set of A.Verify $n(\mathcal{P}(A)) = 2^{n(A)}$.2. Given that $A = \begin{bmatrix} 3 & -1 \\ 0 & -2 \end{bmatrix}$, Verify that $A^2 - A - 6I = O$;3. If A, B and C are three mutually exclusive and exhaustive events and if $3p(A) = 4p(B) = 5p(C)$ then find $p(A')$, $p(B')$ and $p(C')$.

Q.3 Answer the following. (Any Three) (Each of 06 Marks) (18)

1. Each student in a class of 40 plays at least one indoor game from chess, carom and scrabble. 18 play chess, 20 play scrabble and 27 play carom. 7 play chess and scrabble, 12 play scrabble and carom and 4 play chess, carom and scrabble.

Find the number of students who play (i) chess and carom. (ii) chess, carom but not scrabble (iii) at least two games (iv) exactly two games (v) no game.

2. Define singular matrix. Write the following system of equation in the form $AX = B$ and using A^{-1} , solve it.

$$\frac{3}{x} - \frac{4}{y} = 1; \frac{4}{x} - \frac{5}{y} = 1$$

3. A company produces 1,000 refrigerators a week at three plants. Plant A produces 350 refrigerators a week, plant B produces 250 refrigerators a week, and plant C produces 400 refrigerators a week. Production records indicate that 5% of the refrigerators at plant A will be defective, 3% of those produced at plant B will be defective, and 7% of those produced at plant C will be defective. All refrigerators are shipped to a central warehouse. If a refrigerator at the warehouse is found to be defective, what is the probability that it was produced at plant A?
4. Calculate Effective rate of interest if the rate of interest is 10% in each of the following.
- When interest is compounded half yearly
 - When interest is compounded quarterly
 - When interest is compounded monthly.

Q.4 Answer the following. (Any two)

1. (a) A bag contains 2 black, 3 red and 5 blue balls. Three balls are drawn at random. Find total number of possible outcomes. (05)

Also find the probability that (i) the three balls are blue, (ii) two balls are blue and one is red (iii) consists of no red ball (iv) consists of all black balls.

- (b) Calculate the present value of Rs.30,00,000 and Rs. 40,00,000 receivable at the end of 2nd year, and 3rd year respectively at an effective rate of interest of 10% p.a. (04)

2. (a) Write De Morgan's laws for sets. (05)

Verify any one of them for $U = \{x \in \mathbb{Z} | 0 \leq x \leq 8\}$; $A = \{x | x = 2k, k = 0,1,2,3,4\}$ and $B = \{x \in \mathbb{N} | -3 < x < 5\}$.

- (b) How much amount is required to be invested in the beginning of every year so as to accumulate Rs. 7,11,500 at the end of 5 years if the effective rate of interest is 12% per annum? (04)

3. (a) Express $A = \begin{bmatrix} 0 & 2 & 5 \\ -3 & 6 & 11 \\ 10 & 7 & 21 \end{bmatrix}$ as a sum of a symmetric and a skew-symmetric matrix. (05)

- (b) (i) Find simple interest on Rs. 10,000 at the rate of 5% for 5 years. Also find the amount for 5 years. (04)

(ii) Find the compound amount and compound interest on the principal 20,000 borrowed at 6% compounded annually for 3 years.