



HDG-010-001107 Seat No. _____

B. B. A. (Sem. I) (CBCS) Examination
November/December – 2017
Paper - 107 : Business Mathematics-I
(Old Course)

Faculty Code : 010
Subject Code : 001107

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are compulsory.
(2) All questions carry equal marks.

- 1 (a) Explain the meaning of permutations with example and prove that 7

$$\frac{1}{(n-1)!} + \frac{1}{(n-2)!} = \frac{n^2}{n!}$$

- (b) How many different words using all the letters of the word "MAUNISH" can be formed ? How many of them : 7
(i) begin with 'M'
(ii) begin with 'M' and end with 'H'
(iii) vowels are always together ?

OR

- 1 (a) In usual notations prove that 7

$${}_nC_r + {}_nC_{r-1} = {}_{n+1}C_r$$

- (b) A box contains 7 red, 6 white and 4 blue balls. 7
In how many ways selection of 3 balls can be made so that :
(i) All three balls are red balls.
(ii) None is a red ball.
(iii) There is one ball of each colour.

- 2 (a) Define Arithmetic Progression and give formula for finding n^{th} term and sum of n terms of Arithmetic progression. 7
- (b) The sum of five numbers in A.P. is 30 and the product of the first and the last is 20. Find the numbers. 7

OR

- 2 (a) Prove that for any two real numbers
A.M. \geq G.M. \geq H.M. 7
- (b) Insert 4 Geometric means between $\frac{1}{2}$ and 512. 7

- 3 (a) Obtain the middle terms of 7

$$\left(\frac{x}{3} - \frac{3}{x}\right)^5$$

- (b) Find the value of 7

$$(\sqrt{5} + 1)^5 - (\sqrt{5} - 1)^5$$

OR

- 3 (a) Prove the following result by using the principle of mathematical induction 7

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \frac{n^2(n+1)^2}{4}$$

- (b) With the help of principle of mathematical induction prove that for any positive integral value of n 7

$$\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$$

- 4 (a) Define the following terms with example : (any **four**) 7
- (i) One-one function
 - (ii) Equal functions
 - (iii) Constant function
 - (iv) Domain of a function
 - (v) Range of a function
 - (vi) Real functions.

- (b) If $f(x) = x(x+1)(2x+1)$ then prove that 7
- $$f(x) - f(x-1) = 6x^2.$$

OR

- 4 (a) It is observed that a quadratic function 7
- $$y = ax^2 + bx + c$$
- fits the points $(-1, 8)$, $(1, 4)$, $(2, 5)$. Find the constants a , b and c also quadratic equation and estimate y when $x = 4$.

- (b) The fixed cost of a factory is Rs. 60,000 and the 7
- variable cost per unit of production is Rs. 50. If the selling price per unit is Rs. 100 find break-even point.

- 5 Find the following limits : (any **four**) 14

(i) $\lim_{x \rightarrow 7} \frac{x^2 + 2x - 63}{x^2 - 10x + 21}$

(ii) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

(iii) $\lim_{x \rightarrow \infty} \left(1 - \frac{2}{3x}\right)^x$

(iv) $\lim_{x \rightarrow 0} \frac{2^{4x} - 3^{2x}}{x}$

(v) $\lim_{x \rightarrow \infty} \frac{5x^2 + 7x + 2}{3x^2 - x - 4}$

(vi) $\lim_{x \rightarrow 5} \frac{x^3 - 125}{x^2 - 25}$