December 2023

BBA (GEN)- Ist SEMESTER

Business Mathematics (BBA-GN-105)

Time: 3 Hours   **Max. Marks:75**

Instructions: 1. It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.

                  2. Answer any four questions from Part -B in detail.

                  3. Different sub-parts of a question are to be attempted adjacent to each other.

                  4. Any other specific instructions

PART –A

Q1 (a) Write down all the subsets of $\{2,4,5,8\}$.   (1.5)

(b) Evaluate $\int_a^b \frac{\log x}{x} \, dx$.   (1.5)

(c) For what value of k the following series will be in arithmetic progression ?   (1.5)

$$3k^2 + k + 1, 2k^2 + k, 4k^2 - 6k + 1$$

(d) If A=$\{1,2,3,4\}$, B=$\{2,4,5,8\}$ and C=$\{3,4,5,6,7\}$, Find $A \cap (B \cup C)$.   (1.5)

(e) If two dices are thrown randomly, in how many ways they can fall such that sum of both is greater than 8 ?   (1.5)

(f) If $(m+n)_{P_2} = 56$, $(m-n)_{P_2} = 12$, find m and n.   (1.5)

(g) Expand $\left(x^2 + \frac{1}{x^2}\right)^6$.   (1.5)

(h) In how many ways 72 different books can be arranged in a rack if two particular books cannot remain together.   (1.5)

(i) Find $\frac{dy}{dx} = \frac{1+x^2}{1-x^2}$ (1.5)

(j) Solve $x^4 - 10x^2 + 9 = 0$ (1.5)

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PART -B

Q2 (a) In a certain town the inhabitants speak Assamese and Bengali . If 64% can speak $\quad$ (7) Assamese and 55% can Speak Bengali , Find in percent how many can speak both.

(b) In a class of 25 students , 12 have taken mathematics , 8 have taken Mathematics but $\quad$ (8) not Biology. Find the number of students who have taken both Mathematics and Biology and the number of those who have taken Biology but but not Mathematics. Each student has taken either Mathematics or Biology or Both.

Q3 (a) Prove that $(yz)^{logy-logz} \times (zx)^{logz-logx} \times (xy)^{logx-logy} = 1$ $\quad$ (8)

(b) If the demand curve is $p = 20 - 2x$, where p and x are respectively the price and the $\quad$ (7) amount demanded of a commodity, find the consumer's surplus when p=6 and p=10.

Q4 (a) If the sum of first p terms of an A.P. is q and sum of first q terms of an A.P is p, find the $\quad$ (8) sum of (p+q) terms ?

(b) A manufacturing company installs a machine at a cost of Rs 21000. At the end of 20 $\quad$ (7) years , the machine has a value of Rs 3000/- only. Assuming that the yearly depreciation at a constant amount , find the value of the machine after 7 years of installation.

Q5 (a) Show that the permutations of the letters of the word CALCUTTA is twice the $\quad$ (8) permutations of the letters of the word AMERICA.

(b) Expand $(x^2 - \frac{1}{x})^9$ and find the sixth term . Using Binomial theorem find the value of $\quad$ (7) $(99)^4$.

Q6 (a) Solve the system of simultaneous linear equations by Gauss-Jordan Method. $\quad$ (8)

$3x + 2y + z = 0; \ -2x - 5y + 2z = 8; \ x - y - z = -4$

(b) Find the average cost function and the marginal cost function for each of the following $\quad$ (7) total cost functions . Evaluate them at Q=3 and Q=5 where $TC = 3Q^2 + 7Q + 12$.

Q7 (a) Find $\frac{dy}{dx}$ where (i) $y = \frac{x}{e^x - 1}$ $\quad$ ii) $y = \frac{logx}{\sqrt{x}}$ $\quad$ (10)

iii) $y = (1 + x)(1 + 2x)(1 + 3x)$

iv) $y = (3 - 2x)\sqrt{x^2 - 1}$

(b) $\quad$ (5)

Find $\int \frac{3x+4}{x^2+x+6} dx$