

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION MAY 2024
(First Semester)

Common to Branches – **CORPORATE SECRETARYSHIP/ COMMERCE/
COMMERCE (CA)/ e-COMMERCE/ COMMERCE (PA)/ COMMERCE (A&F)/
COMMERCE (RM)/ COMMERCE (FS)/ COMMERCE (FT)/ COMMERCE (B&I)**

MATHEMATICS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10 x 1 = 10)

- 1 The Simple Interest on the sum of Rs. 6,000 at 10% p.a. for 3 years is
 - (i) Rs. 1,000
 - (ii) Rs. 1,800
 - (iii) Rs. 1,500
 - (iv) Rs. 2,000
- 2 The present value under annuity due is
 - (i) $\frac{A}{i} [1 - (1+i)^{-n}]$
 - (ii) $A + \frac{A}{i} [(1+i)^n + 1]$
 - (iii) $\frac{A}{i} [(1+i)^n - 1]$
 - (iv) $\frac{A}{i} [(1+i)^{-n} + 1]$
- 3 The adjoint of $A = \begin{bmatrix} 1 & 5 \\ -3 & 0 \end{bmatrix}$ is
 - (i) $\begin{bmatrix} 0 & -5 \\ 3 & 1 \end{bmatrix}$
 - (ii) $\begin{bmatrix} 1 & -3 \\ 5 & 0 \end{bmatrix}$
 - (iii) $\begin{bmatrix} 1 & 5 \\ -3 & 0 \end{bmatrix}$
 - (iv) $\begin{bmatrix} -1 & 5 \\ -3 & 0 \end{bmatrix}$
- 4 The matrix which has only one column is called
 - (i) row matrix
 - (ii) column matrix
 - (iii) rectangular matrix
 - (iv) square matrix
- 5 The relation between average revenue, marginal revenue and elasticity of demand is given by
 - (i) $\frac{MR}{AR} = 1 - \frac{1}{\eta_d}$
 - (ii) $\frac{AR}{MR} = 1 - \frac{1}{\eta_d}$
 - (iii) $MR = \frac{AR - \eta_d}{\eta_d - 1}$
 - (iv) $\eta_d = \frac{MR}{AR - MR}$
- 6 The derivative of \sqrt{x} is
 - (i) $\frac{1}{\sqrt{x}}$
 - (ii) $\frac{1}{2\sqrt{x}}$
 - (iii) $\frac{1}{2}\sqrt{x}$
 - (iv) $2\sqrt{x}$
- 7 The value of $\int_{-1}^1 5x^4 dx$ is
 - (i) 2
 - (ii) 0
 - (iii) 5
 - (iv) 20

Cont...

- 8 The value of $\int \frac{dx}{x}$ is
 (i) $\log x + c$ (ii) $e^x + c$
 (iii) $\frac{1}{x^2} + c$ (iv) $-\frac{1}{x^2} + c$
- 9 which of the following is not associated with any L.P.P?
 (i) optimum solution (ii) feasible solution
 (iii) basic solution (iv) complete solution
- 10 A basic solution to the system of linear equations $AY = B$ is _____ if all the basic variables are non-zero.
 (i) degenerate (ii) no degenerate
 (iii) bounded (iv) unbounded

SECTION - B (25 Marks)

Answer ALL questions
 ALL questions carry EQUAL Marks (5 x 5 = 25)

- 11 a. A sum of money invested at compound interest amounts to Rs 21632 in 2 years and to Rs. 22497.28 in 3 years. Find the rate of interest and sum invested.
 (OR)
 b. A bill drawn on 20th June 2000 at 3 months sight was accepted on 24th June 2000. The Banker's gain while discounting the bill on 28th July 2000 at 6% per annum was Re 1. Find the face value.

- 12 a. Solve the following by Cramer's Rule.

$$\begin{aligned} x - 2y &= 16 \\ 3x + y &= -1 \end{aligned}$$
 (OR)

b. $A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 3 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 5 \\ 7 & 3 \\ 5 & -2 \end{bmatrix}$ Find AB.

- 13 a. Differentiate the following with respect to x.
 $y = (x^5 - 2x^2 + 1)(7x^{11} - 4)$

(OR)
 b. If $y = ax^2 + bx$, show that $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} + 2y = 0$

- 14 a. Integrate with respect to x: $\frac{x^3 - x + 4}{x^2}$
 (OR)

b. Evaluate: $\int x e^{mx} dx$

- 15 a. Solve the problem graphically

$$\text{Min } Z = 3x_1 + 5x_2$$
 Subject to constraints: $x_1 + x_2 \geq 200$
 $x_1 \leq 80$
 $x_2 \leq 60$
 $x_1, x_2 \geq 0$

(OR)

Cont...

- b. Solve by simplex method:

$$\text{Max: } Z = 3x_1 + 4x_2$$

$$\text{Subject to constraints: } 4x_1 + 2x_2 \leq 80$$

$$2x_1 + 5x_2 \leq 180.$$

$$x_1, x_2 \geq 0$$

SECTION -C (40 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

- 16 a. Mr. Guru acquired a plant delivered on Jan 1, 1990 on the following terms:

(i) Initial payment of Rs. 40,000 immediately

(ii) 4 half yearly instalments of Rs. 30,000 each commencing Jun 30, 1990.

Interest in 10% with yearly rests. What is the cash price?

(OR)

- b. A bill for Rs. 1,825 was drawn on 22
- nd
- January at 6 months date and discounted on 16
- th
- April at the rate of 10% per annum. Find the sum for which the bill was discounted and the banker's gain.

- 17 a. Find the inverse of matrix:
- $A = \begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$

(OR)

- b. Solve by inverse matrix method

$$5x - 6y + 4z = 15$$

$$7x + 4y - 3z = 19$$

$$2x + y + 6z = 46.$$

- 18 a. Find the maximum and minimum values of the expression,
- $2x^3 - 21x^2 + 36x - 20$
- .

(OR)

- b. Evaluate
- $\lim_{x \rightarrow 0} \frac{4x^4 + 3x^3}{2x^4 - x^3 - 3x^2}$
- using L'Hospital's Rule.

- 19 a. Evaluate,
- $\int \frac{(x^2 + x + 1)}{(x-1)^2(x-2)} dx$
- using partial fraction method.

(OR)

- b. Find the consumers' and producers' surplus at equilibrium price if the demand function
- $D = \frac{25}{4} - \frac{p}{8}$
- and supply function is
- $p = 5 + D$
- .

- 20 a. Use simplex method to solve

$$\text{Max } Z = x_1 + x_2 + 3x_3$$

Subject to constraints:

$$3x_1 + 2x_2 + x_3 \leq 3$$

$$2x_1 + x_2 + 2x_3 \leq 2$$

$$x_1, x_2, x_3 \geq 0$$

(OR)

- b. Solve by using graphical method.

$$\text{Max } z = 4x + 7y$$

Subject to the constraints:

$$x + y \leq 60,$$

$$x \leq 40,$$

$$y \leq 40,$$

$$x, y \geq 0.$$

Z-Z-Z

END