

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BCom (CS) DEGREE EXAMINATION DECEMBER 2019
(First Semester)

Branch – **CORPORATE SECRETARYSHIP**

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 present value of perpetuity of Rs.5,000 at 20% p.a. is Rs.- _____.
(i) 1000 (ii) 6000 (iii) 25000 (iv) 1,00,000
- 2 Calculate the simple interest for Rs.10,000 for 73 days at 10% p.a. Rs. _____.
(i) 15 (ii) 20 (iii) 40 (iv) 7300
- 3 A matrix which has only one column is _____ matrix.
(i) row (ii) column (iii) rectangular (iv) square
- 4 A square matrix A is an orthogonal matrix if
(i) $AA^T=I$ (ii) $AA^{-1}=I$ (iii) $A=A^{-1}$ (iv) $A=A^T$
- 5 $\frac{d}{dx}(\log 4x) =$
(i) $\frac{1}{4x}$ (ii) $\frac{1}{x}$ (iii) $\log(4x)$ (iv) 0
- 6 $\frac{d^2}{dx^2}(x^n) =$
(i) $n x^{n+1}$ (ii) $n x^n$ (iii) $n(n-1)x^{n-2}$ (iv) $n x^{n-1}$
- 7 $\int_0^2 x^3 dx =$
(i) 8 (ii) 4 (iii) 2 (iv) 0
- 8 $\int e^{2x} dx =$
(i) $\frac{e^{2x}}{2} + c$ (ii) $e^{2x} + c$ (iii) $2e^{2x}$ (iv) $2e^x + c$
- 9 Solution which optimized objective function is called _____ solution.
(i) Feasible (ii) Optimal (iii) Optional (iv) Correct
- 10 _____ is not associated with any L.P.P.
(i) Feasible Solution (ii) Optimum Solution
(iii) Basic Solution (iv) Quadratic equation

SECTION - B (25 Marks)

Answer **ALL** questions

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

- 11 a A sum of money amounted to Rs.1,071 in 6 months and Rs.1,106 in 16 months. Calculate the rate of Simple Interest.

OR

- b Calculate the compound interest for Rs.2,500 for 4 years at 8% per annum when interest is compounded a) half yearly and b) quarterly.

- 12 a If $A = \begin{pmatrix} 2 & 0 & -1 \\ 2 & 4 & -1 \\ 1 & -8 & -3 \end{pmatrix}$, show that $A \cdot (\text{Adj } A) = |A|I_3$

OR

- b If $10A - 50I = 0$ and $A = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \end{bmatrix}$, find A^{-1} .

- 13 a Differentiate the following with respect to x.
 (i) $x^3 - 3x^2 + 4x + 3$ (ii) $x^5 + 3 \log x - 4e^x$

OR

- b If $y = (4x^3 - x)(7x^2 + 6x + 3)e^x$, find $\frac{dy}{dx}$.

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

OR

- b Evaluate $\int \frac{x^3}{(x^2 + 1)^3} dx$.

- 15 a Solve the L.P.P Max $z = 3x_1 + 4x_2$
 subject to $4x_1 + 2x_2 \leq 80$, $2x_1 + 5x_2 \leq 180$
 and $x_1, x_2 \geq 0$ graphically

OR

- b ABC animal feed company must produce at least 200 kg. of a mixture consisting of ingredients A and B daily. A costs Rs.3 per kg and B costs Rs.5 per kg. Not more than 80 kg of A can be used and at least 60 kg of B must be used. Find the minimum cost mixture by graphical method.

SECTION -C (40 Marks)

Answer ALL questions

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

- 16 a Find the true discount and the banker's discount on a bill whose present value is Rs.10,000 and which is (legally) due 4 months hence at 10% p.a. What are its face value and cash value? How much is the banker's gain?

OR

- b Find the banker's gain on a bill of Rs.2,000 for 4.5 months at 4% p.a.

- 17 a Using matrix inversion method, solve the following system of equation:
 $2x - y + 3z = 1$, $x + y + z = 2$, $x - y + z = 4$.

OR

- b Use determinants and solve $\frac{1}{a} + \frac{2}{b} = 4$, $\frac{3}{a} - \frac{1}{b} = 5$.

- 18 a A steel plant produces x tons of steel per week at a total cost of Rs. $\left(\frac{x^3}{3} - 5x^2 + 99x + 35\right)$.

Find the output level at which the marginal cost attains its minimum.

OR

- b If $y = x + \sqrt{x^2 + a^2}$ show that $\frac{d^2y}{dx^2} = \frac{1}{2\sqrt{2a}}$ at $x = a$.

- 19 a Using partial fractions, solve $\int \frac{(x^2 + x + 1)dx}{(x-1)^2(x-2)}$.

OR

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

- 20 a Solve the L.P.P Max $z = 3x_1 + 4x_2$
 subject to $4x_1 + 2x_2 \leq 80$, $2x_1 + 5x_2 \leq 180$
 and $x_1, x_2 \geq 0$ by the Simplex method.

OR

- b Solve Maximize $z = x_1 + x_2$
 subject to $-2x_1 + x_2 \leq 1$, $x_1 \leq 2$, $x_1 + x_2 \leq 3$