

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

Branch -- **COMMERCE (BUSINESS PROCESS SERVICES)**

MATHEMATICS FOR BUSINESS PROCESS

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 Rs.20,000 at 20% for 5 years is _____.
(i) Rs.29,000.40 (ii) Rs.29,766.40 (iii) Rs.20,000.00 (iv) Rs.26,500.40
- 2 The exact simple interest for Rs.1000 for 73 days at 10% p.a is _____.
(i) Rs.15 (ii) Rs.20 (iii) Rs.40 (iv) Rs.7300
- 3 $\begin{bmatrix} 3 & 8 & 9 & -2 & 3 \end{bmatrix}$ is a row matrix of order _____.
(i) 5 x 1 (ii) 1 x 5 (iii) 1 x 2 (iv) 2 x 5
- 4 $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ is _____.
(i) a scalar matrix (ii) an unit matrix (iii) a square matrix (iv) a rectangular matrix
- 5 The eigen values of the matrix A are 1,2,3 then the eigen values of the matrix 2A are _____.
(i) 2,4,6 (ii) 1,4,6 (iii) $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ (iv) $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}$
- 6 The product of the eigen values of the matrix $A = \begin{bmatrix} 4 & -2 \\ 3 & -1 \end{bmatrix}$ is _____.
(i) 1 (ii) 2 (iii) 3 (iv) 4
- 7 Find $\frac{d(e^{-x})}{dx} =$ _____.
(i) e^x (ii) e^{-x} (iii) $-e^{-x}$ (iv) 2x
- 8 Find $\frac{d\sqrt{x}}{dx} =$ _____.
(i) $\frac{1}{\sqrt{x}}$ (ii) \sqrt{x} (iii) $2\sqrt{x}$ (iv) $\frac{1}{2\sqrt{x}}$
- 9 The value of $\int_0^2 (x+1)dx =$ _____.
(i) $\frac{3}{2}$ (ii) $\frac{1}{2}$ (iii) 2 (iv) 4
- 10 $\int x^{3/2} dx =$ _____.
(i) $\frac{1}{2\sqrt{x}}$ (ii) $\frac{x^{5/2}}{2}$ (iii) $\frac{x^{5/2}}{5/2}$ (iv) $\frac{x^{5/2}}{5}$

SECTION - B (25 Marks)

Answer **ALL** questions

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

- 11 a Rs.6000 amounts to Rs.8,940 at 14% p.a interest. Find the number of years for which the amount was lent.

OR

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

- 12 a If show that the matrix is $\frac{1}{3} \begin{pmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{pmatrix}$ is orthogonal.

OR

- b Find the rank of the matrix is $\begin{pmatrix} 4 & -5 & 1 & 2 \\ 3 & 1 & -2 & 9 \end{pmatrix}$.

- 13 a Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & -1 & 0 \\ 0 & 1 & -1 \\ 1 & 0 & 1 \end{bmatrix}$.

OR

- b Find the eigen values and eigen vectors of the matrix $A = \begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$.

- 14 a Find the derivative of the following

(i) $y = (x^2 + 5)(3x + 1)$ (ii) $y = \frac{3x^2}{4x - 1}$

OR

- b Find the derivative of the following

(i) $(2x - 7)^4$ and find the value when $x = 5$.

- 15 a Evaluate $\int \left(\frac{x^3 - x + 4}{x^2} \right) dx$.

OR

- b If the marginal revenue function is $R'(x) = 15 - 9x - 3x^2$, find the revenue function and demand function.

SECTION - C (40 Marks)

Answer **ALL** questions

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

- 16 a (i) Calculate the compound interest for Rs.2,500 for 4 years at 8% p.a. and also calculate the C.I for (ii) compounded Half-yearly (iii) compounded Quarterly

OR

- b In a company machine costs Rs.80,000 and its life is estimated to be 20 years. Sinking fund is created for replacing the machine at the end of its life time when its scrap realizes a sum of Rs.5,000 only. Calculate the amount which should be provided every year for the sinking fund if it accumulates at 9% p.a compounded annually.

- 17 a Show that the vectors (1,2,3), (3,-2,1), (1,-6,-5) form a linearly independent set.

OR

- b Test the consistency of the following system of equations and hence solve it.
 $x + 2y + z = 3$; $2x + 3y + 2z = 5$; $3x - 5y + 5z = 2$; $3x + 9y - z = 4$.

- 18 a Find the eigen values and eigen vectors of the matrix $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.

OR

- b Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{pmatrix}$ and also find its inverse.

- 19 a If $y = ae^{mx} + be^{-mx}$ show that $\frac{d^2y}{dx^2} = m^2y$.

OR

- b If the demand law is $x = \frac{20}{p+1}$, find the elasticity of demand at the point when $p = 3$.

(ii) If the demand function is $p = 4 - 5x$, for what value of x will elasticity of demand be unitary?

- 20 a Evaluate $\int_0^2 (x^2 - 4x + 5) dx$.

(ii) Evaluate $\int x^2 e^x dx$ by integration by parts.

OR

- b Find the consumers' producers' surplus at equilibrium price is the demand function

is $D = 25 - p$ and supply function is $p = 5 + D$