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

Branch - **COMMERCE**

## 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 S.I on Rs. 5,000 at 10% for 3 years is Rs._____ .
     (i)   500 (ii) 1,000 (iii) 1,500 (iv) 6,500

2    The compound interest for Rs. 10,000 for 2 years at 10% p.a. is Rs.
     (i)   2,000 (ii) 2,100 (iii) 2,200 (iv) 12,000

3    [3 8 9 -2] is a row matrix of order
     (i)   4x1 (ii) . 1 x 4  (iii) 1 x 1                         (iv) 1x2

4    $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ is          matrix.
     (i)   Scalar        (ii) Unit          (iii) Square (iv) Rectangular

5    $\dfrac{d(v\,x)}{dx} =$
     (i)   $\dfrac{1}{Vx}$        (ii) Vx        (iii) 2Vx        (iv) 2 Vx

6    $\dfrac{d(e^{-x})}{dx} =$
     (i) $e^x$        (ii) e":        (iii) -e':        (iv) 0

7    $\int_{-1}^{1} 5x^4 dx =$
     (i)   0          (ii) 2          (iii) 5          (iv) 3

8    $\int \dfrac{f'(x)}{f(x)}\,dx =$
     (i) log f(x) (ii) log f (x) (iii) log f (x) + c (iv) f(x)

9    In a linear programming minimization model, the objectives function is
     (i)   Minimized                     (ii) Maximized
     (iii) Minimized(or) Maximized       (iv) Optimized

10   Optimization means
     (i)   Maximisation  of profit       (ii) Minimisation  of cost
     (iii) Both                          (iv) Increasing

### SECTION - B (25 Marks)
Answer **ALL** questions
**ALL** questions carry **EQUAL** Marks ( 5 x 5 = 25)

11 a A certain sum amounts to Rs. 4,000 at the end of 5 years a| 12% p.a. interest. Find the sum
                                    OR
   b Find the compound interest on Rs. 20,000 for 5 years at 20% per annum. What will
     be the simple interest in the above case?

12 a Find the minor and cofactor of all the elements of $\begin{bmatrix} 3 & 2 \\ 5 & 0 \end{bmatrix}$
                                    OR
   b Find the inverse of A = $\begin{bmatrix} 2 & 2 \\ 3 & 5 \end{bmatrix}$

13 a Differentiate with respect to x : $\dfrac{1}{x^5} + \dfrac{1}{\sqrt{x}} = + x-$

<div align="center">OR</div>

b Find the derivative of y' $\dfrac{3x''}{4x-1}$

14 a Evaluate $\int \sqrt{\dfrac{x}{x}}$ dx.

<div align="center">OR</div>

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

15 a A company makes three products X, Y and Z which pass through three departments. Drille, Lathe and Assembly. The hours available in each department, hours required by each product in each department and profit contribution of each product and given below:

| Product | Time required in hours | | | Profit per unit (Rs.) |
|---|---|---|---|---|
| | Drill | Lathe | Assembly | |
| X | 3 | 3 | 8 | 9 |
| Y | 6 | 5 | 10 | 15 |
| Z | 7 | 4 | 12 | 20 |
| Flours available | 210 | 240 | 260 | |

Formulate the above as an L.P.P.

<div align="center">OR</div>

b Solve the L.P.P : Min $Z = 3x_1 + 5x_2$
subject to $x_i + X_2 > 200$, $x_1 < 80$, $X_2 > 60$
and $X_1$, $X_2 > 0$ graphically.

<div align="center">

### SECTION -C (40 Marks)
Answer **ALL** questions
**ALL** questions carry **EQUAL** Marks ( 5 x 8  = 40)

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16 a A bill for Rs. 1,825 was drawn on $22^{nd}$ January at 6 months date and discontinued 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.

<div align="center">OR</div>

b The banker's discount is 51 times the banker's gain. Find the term of the bill if interest is 8% p.a.

17 a Show that the matrix A $\begin{pmatrix} 2 & -1 & P \\ -1 & 2 & -1 \\ 1 & 1 & 2 \end{pmatrix}$ satisfies the equation

$A^3 - 6 A^2 + 9 A - 41 = 0$. Hence deduce the value of $A'^1$.

<div align="center">OR</div>

b Solve the following system of simultaneous equations by Cramer's rale:
$2x + 3y + 3z = 22$, $x - y + z = 4$, $4x + 2y - z = 9$.

18 a Find for what values of x, the following expression is maximum and minimum respectively: $2x^3 - 21x^2 + 36x - 20$. Find also the maximum and the minimum values.

<div align="center">OR</div>

b If $y = (x + \sqrt{x^2 -1})^{ra}$, prove that $(x^2-1)\dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} - m^2y = 0$.

19 a Evaluate $\int \dfrac{28x\,dx}{(x + 3)(5x^z + 2x + 3)}$

<div align="center">OR</div>

b Integrate $(\log x)^3$ with respect to x.

20 a Use Simplex method to solve Max $z = x_i + x_2 + 3x_3$ subject to constraints
$3x_i + 2x_2 + x_3 < 3$, $2x_i + X_2 + 2x_3 < 2$ and $x_i$, $X_2$, $x_3 > 0$.