

**PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)**

**BCom DEGREE EXAMINATION DECEMBER 2025  
(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 × 1 = 10)

| Module No. | Question No. | Question  | K Level | CO  |
|------------|--------------|---|---------|-----|
| 1          | 1            | The simple interest on Re1 at 1% for 1 year is<br>(a) 1paise (b) 2 paise<br>(c) 3 paise (d) 4 paise   | K1      | CO1 |
|            | 2            | If each payment of an annuity is made at the end of each period then the annuity is called<br>(a) Immediate annuity (b) Annuity due<br>(c) Perpetuity (d) Deferred annuity  | K2      | CO2 |
| 2          | 3            | If A is a skew-Hermitian matrix, then its diagonal entries are<br>(a) only zeroes (b) only purely imaginary<br>(c) purely real (d) purely imaginary or zero   | K1      | CO1 |
|            | 4            | The vectors (0,0,0), (2,5,8) and (100,200,300) are<br>(a) linearly independent (b) linearly dependent<br>(c) parallel (d) perpendicular   | K2      | CO4 |
| 3          | 5            | Given that the eigen values of the matrix A are 1,2,3. Then the eigen values of the matrix A-3I where I is the unit matrix are<br>(a) 1,0,2 (b) -2,-1,0<br>(c) 3,2,4 (d) 1,1,1  | K1      | CO2 |
|            | 6            | The characteristic equation of the matrix $\begin{pmatrix} 2 & 3 \\ 4 & 0 \end{pmatrix}$ is<br>(a) $\lambda^2 - 2\lambda - 12 = 0$ (b) $\lambda^2 - 3\lambda + 2 = 0$<br>(c) $\lambda^2 + 5\lambda + 6 = 0$ (d) $\lambda^2 + 6\lambda + 5 = 0$  | K2      | CO3 |
| 4          | 7            | Derivative of $(2x)^n + \sin 2x$ with respect to x is<br>(a) $n2^n x^{n-1} - \cos 2x$ (b) $n2^n x^{n-1} + 2\cos 2x$<br>(c) $n2^n x^{n-1} + \cos 2x$ (d) $n2^n x^{n+1} - 2\cos 2x$   | K1      | CO1 |
|            | 8            | The relation between marginal revenue and elasticity of demand.<br>(a) $M_R = 1 + \frac{1}{\text{elasticity of demand}}$<br>(b) $M_R = 1 - \frac{1}{\text{elasticity of demand}}$<br>(c) $M_R = 2 - \frac{1}{\text{elasticity of demand}}$<br>(d) $M_R = 2 + \frac{1}{\text{elasticity of demand}}$ | K2      | CO4 |
| 5          | 9            | Integrating $\frac{x+1}{x^2}$ with respect to x gives<br>(a) $\log x - \frac{1}{x} + c$<br>(b) $\log x + \frac{1}{x} + c$<br>(c) $\log 2x - \frac{1}{x} + c$<br>(d) $\log 2x + \frac{1}{x} + c$   | K1      | CO1 |
|            | 10           | $\int_0^2 e^{2x} dx$ equals to<br>(a) $\frac{e^3-1}{2}$ (b) $\frac{e^3+1}{2}$<br>(c) $\frac{e^4-1}{2}$ (d) $\frac{e^4+1}{2}$  | K2      | CO3 |

Cont...

**SECTION - B (35 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

| Module No. | Question No. | Question  | K Level | CO  |
|------------|--------------|---|---------|-----|
| 1          | 11.a.        | A machine depreciates at the rate of 5% of its value at the beginning of a year. If the machine was purchased for Rs.5000, what is the minimum number of complete years at the end of which the worth of the machine will be less than half of its original cost price? | K1      | CO1 |
|            |              | (OR)  |         |     |
|            | 11.b.        | A person has taken a loan of Rs 5000 from a bank at 8% simple interest. He paid Rs 1500 at the end of first year, Rs 2000 at the end of second year and the balance together with interest at the end of third year. How much did he pay at the end of third year?      |         |     |
| 2          | 12.a.        | Find the rank of the matrix $\begin{pmatrix} 1 & -2 & 3 \\ 4 & 6 & -7 \\ 6 & 2 & -1 \end{pmatrix}$  | K3      | CO5 |
|            |              | (OR)  |         |     |
|            | 12.b.        | Prove that product of two orthogonal matrices is also an orthogonal matrix.   |         |     |
| 3          | 13.a.        | Find the eigen vectors of the matrix $\begin{pmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix}$ .  | K4      | CO5 |
|            |              | (OR)  |         |     |
|            | 13.b.        | Given that one of the eigen values of the matrix $\begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$ is 2. Find the eigen values of its inverse matrix.  |         |     |
| 4          | 14.a.        | If $y = \sqrt{x + \sqrt{x + \sqrt{x + \dots}}}$ , then find $\frac{dy}{dx}$ .   | K3      | CO5 |
|            |              | (OR)  |         |     |
|            | 14.b.        | Find $\frac{dy}{dx}$ where $y = \log_a(x + \sqrt{x^2 + a^2})$ .   |         |     |
| 5          | 15.a.        | Evaluate $\int \frac{\log x}{(1+x)^2} dx$ .   | K2      | CO4 |
|            |              | (OR)  |         |     |
|            | 15.b.        | Evaluate $\int \frac{e^x dx}{e^{2x} + 3e^x + 2}$ .  |         |     |

**SECTION - C (30 Marks)**

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

| Module No. | Question No. | Question  | K Level | CO  |
|------------|--------------|---|---------|-----|
| 1          | 16           | A bill of Rs 3225 was drawn on 3 <sup>rd</sup> February 1965 at 6 months due date and discounted on 13 <sup>th</sup> March 1965 at the rate of 8% per annum. Find the sum of the bill discounted and also find the banker's gain. | K2      | CO4 |
| 2          | 17           | Test the consistency of the equations $4x - 2y + 6z = 8$<br>$x + y - 3z = -1$ $15x - 3y + 9z = 21$ .<br>Also find the solution if it is consistent.   | K3      | CO5 |
| 3          | 18           | Verify Cayley-Hamilton theorem for the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$ and using it find its inverse.  | K1      | CO1 |
| 4          | 19           | The cost function for producing $x$ units of a product is $C(x) = x^3 - 12x^2 + 48x + 11$ and the revenue function $R(x) = 83x - 4x^2 - 21$ . Find the output for which the profit is maximum.                                    | K4      | CO5 |
| 5          | 20           | The marginal revenue function is $R'(x) = 16 - x^2$ and the marginal cost function is $C'(x) = 10 + 24x - 3x^2$ and the fixed cost is Rs100. Find the profit function and maximum revenue.  | K5      | CO4 |