PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BCom DEGREE EXAMINATION MAY 2024
(First Semester)

Branch – **COMMERCE (BUSINESS ANALYTICS)**

MATHEMATICAL TECHNIQUES FOR BUSINESS ANALYTICS

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Question No.	Question	K Level	CO
1	Calculate the exact simple interest for Rs. 500 for 80 days at 6% per annum (a) 6.67 (b) 6.77 (c) 6.58 (d) 6.08	K1	CO1
2	An annuity is payable for a fixed number of periods is called _____ (a) fixed annuity (b) immediate annuity (c) annuity certain (d) contingent annuity	K2	CO1
3	Given A is 2 x 2 Matrix and B is 2 x 3 matrix, then AB is a _____ matrix. (a) 2 x 2 (b) 3 x 3 (c) 2 x 3 (d) 3 x 2	K1	CO2
4	Find 'a' when $B = \begin{pmatrix} 1 & 4 \\ 2 & a \end{pmatrix}$ is a singular matrix (a) 8 (b) 4 (c) 5 (d) 6	K2	CO2
5	Find the distance between A(-3,3) and B(5,9) (a) 10 (b) 11 (c) 12 (d) 13	K1	CO3
6	The slope of a demand curve is (a) Positive (b) negative (c) 0 (d) not exists	K2	CO3
7	Find the derivative of e^{ax+b} with respect to x (a) e^{ax+b} (b) ae^{ax+b} (c) be^{ax+b} (d) $(ax+b)e^{ax+b}$	K1	CO4
8	How will interpret price elasticity of demand when $\lvert\eta_d\rvert < 1$ (a) Inelastic (b) Unitary elastic (c) Elastic (d) positive elastic	K2	CO4
9	Which of the following is not another name of integral? (a) Anti derivative (b) primitive (c) Integration (d) particular integral	K1	CO5
10	$\int log\ x\ dx =$ _____ a) x logx (b) logx - x (c) xlogx - x (d) x - log x	K2	CO5

SECTION - B (35 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Question No.	Question	K Level	CO
11.a.	A certain amount of money was invested at 8% simple interest and after 9 months an equal amount was invested at 10% simple interest. Find the period in which the amount in each case becomes Rs. 2600. How much was invested in each case.	K2	CO1
	(OR)		
11.b.	(i) How many annual payments of Rs. 50 each are needed to accumulate Rs. 1000, if the interest is 5% compounded annually? (ii) Find the sum of an immediate annuity consisting of 5 annual payments of Rs. 200, if the rate of interest is 4% compounded annually.		

Cont...

12.a.	Show that $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$ satisfies the equation $A^2 - 4A - 5I = 0$	K3	CO2
	(OR)		
12.b.	Find the inverse of the matrix $A = \begin{pmatrix} 4 & 0 & 2 \\ 2 & 10 & 2 \\ 3 & 9 & 1 \end{pmatrix}$ by adjoint matrix method.		
13.a.	Find the point which divides the line joining A(2,3) and B(12,18) in the ratio 2:3. What is the mid point of AB?	K3	CO3
	(OR)		
13.b.	The demand and supply curves are given by $y = 10 - 3x^2$ and $y = 4 + x^2 + 2x$. Find the equilibrium price and quantity.		
14.a.	Given $y = ae^{mx} + be^{-mx}$, then show that $\frac{d^2y}{dx^2} = m^2y$.	K4	CO4
	(OR)		
14.b.	The total cost function of a firm is given by $c = 0.04q^3 - 0.9q^2 + 10q + 10$. Find (i) Average cost and marginal cost (ii) Value of q at which average variable cost is minimum.		
15.a.	Evaluate (i) $\int_0^2 (x^2 - 4x + 5)\, dx$ and (ii) $\int_0^4 (\sqrt{x} + e^x)\, dx$.	K4	CO5
	(OR)		
15.b.	Evaluate $\int \frac{1+x\log x}{x} e^x dx$.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Question No.	Question	K Level	CO
16	Find the present value of a deferred annuity of Rs. 2000 per year, if the first payment begins at the end of 5 years and to continue for 12 years, for 5% compound interest.	K4	CO1
17	Consider an economy of two industries P and Q where the data in millions of rupees is given below: **Prouducer** | **User** P | **User** Q | **Final demand** | **Total output** P | 14 | 6 | 8 | 28 Q | 7 | 18 | 11 | 36 Determine the output if the final demand changes to 20 for P and 30 for Q.	K4	CO2
18	A company estimates that when its sales is Rs. 60,000 and its variable expense will be Rs. 30,000 for a fixed expense of Rs.10,000. Find the break-even point. Also find the profit when the sales is Rs. 50,000?	K4	CO3
19	Evaluate $\lim_{x \to 0} \frac{4x^4+3x^3}{2x^4-x^3-3x^2}$ using L' Hospital's rule.	K4	CO4
20	Find the consumers and producers surplus at equilibrium price if the demand function is $D = \frac{25}{4} - \frac{p}{8}$ and supply function is $p = 5 + D$.	K4	CO5

Z-Z-Z END