UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec 2021

Course: Business Mathematics   Semester: I
Program: BBA-DM-I
Time: 03 Hours
Course code: Max. Marks: 100
Instructions:

SECTION A

		Marks	CO
	All questions are compulsory.		
Q1	What is eleventh term of the series 3,5.5,8,10.5,……? (a) 28.5 (b) 28 (c) 27.5 (d)30	2	CO1
Q2	A unit matrix is (a) a diagonal matrix (b) a scalar matrix (c) a square matrix (d) All of the these	2	CO1
Q3	The derivative of log x is (a) x^{-1} (b) 0 (c) x (d) $\frac{logx}{x}$	2	CO1
Q4	$n(A - B) + n(B - A) = ?$ (a) $n(AUB) - n(A \cap B)$ (b) $n(A \cap B)$ (c) $n(A \cup B)$ (d) $\emptyset$	2	CO1
Q5	The sum of the series $3 - 1 + \frac{1}{3} - \frac{1}{9} + \cdots$ (a) 20/9 (b) 9/4 (c) 27/4 (d) 1/3	2	CO1
Q6	Cardinality of {0} is (a) 0 (b) Not defined (c) ∞ (d) 1	2	CO4
Q7	If $A = \{x, y, z\}$,the number of subsets in $P(A) is$ (a) 6 (b) 8 (c) 9 (d) 10	2	CO1
Q8	Rank of a matrix (a) Is the number of non-zero rows in row echelon form. (b) Is the order of a highest order non-vanishing minor of the matrix. (c) Both (a) and (b) (d) None of the above	2	CO1

Q9	If derivative of x^3 is $3x^2$, integration of $3x^2$ is
	    (a) x^3 (b) $x^3 + c, c\ is\ a\ constant$
	    (c) x^2 (d) all of these
		2	CO4

Q10	$\int x^n dx = \frac{x^{n+1}}{n+1} + C$ is not possible for
	    (a) n=-1 (b) x=0
	    (c) n=1 (d) all of these
		2	CO1

SECTION-B

Q1	(a) Write the solution set of the equation $x^2 - 4 = 0$ in roster and set builder form, (b) What is difference between equivalent sets and equal sets? Explain with example.	5	CO4
Q2	Karan draws monthly salary of ₹15,000. His employer promised him that his salary would be increased annually by one-tenth of the previous salary. Find the monthly salary of the person in tenth year.	5	CO3
Q3	If $y = 2^x + xe^x + \frac{6x^2}{2-x}, then\ find\ \frac{dy}{dx}\ at\ x = 1$. **OR** Determine where, if anywhere, the function $f(z) = 2z^4 - z^3 - 3z^2$ is not changing.	5	CO2
Q4	Evaluate $\int \frac{\log x}{x^2}$.	5	CO4

SECTION-C

Q1	In a group, there were 115 people whose proofs of identity were being verified. Some had passport, some had voter id and some had both. If 65 had passport and 30 had both, how many had voter id only and not passport? **OR** Find the equation of the tangent line to the curve $x^4 + y^2 = 3\ at\ \left(1, -\sqrt{2}\right)$	10	CO3
Q2	A construction company will be penalized each day of delay in construction for bridge. The penalty will be Rs.40000 for the first day and will increase by Rs.10000 for each following day. Based on its budget, the company can afford to pay a maximum of Rs.1650000 toward penalty.	10	CO3

	Find the maximum number of days by which the completion of work can be delayed.		
Q3	Evaluate $\int 8x^2(3x^3 - 1)^{16}dx$.	10	CO4
	SECTION-D		
Q1	Find $\frac{dy}{dx}$ (i) $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \ldots}}}}$ (ii) $y = x^{x^x}$	15	CO4

Q2	If f(x)=$f(x) = 2x^5 - 5x^4 - 10x^3$,then find
	   (i) its critical points.
	   (ii) maxima and minima
	        Also, determine whether the function is decreasing or increasing at
	$$x = \frac{1}{2}, x = \frac{5}{2}$$
	
	OR
	Evaluate the following integrals:
	$$(i) \int_4^5 \frac{3x + 11}{x^2 - x - 6} dx$$
	
	$$(ii) \int_1^3 \frac{e^{\frac{2}{x}}}{x^2} dx$$
		15	CO4