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GOPAL GOVIND POY RAITURCAR COLLEGE OF COMMERCE AND ECONOMICS
PONDA -GOA

B.C.A. (SEMESTER - I) EXAMINATION – OCTOBER 2011
BASIC MATHEMATICS

Duration: 2 Hours

Marks: 50

Instructions :

- 1) Q1. is compulsory. Q2 – Q5 either A or B must be answered.
- 2) Numbers to the right indicate the full marks for each question.

Q1. (A) Fill in the blanks:

- (i) A piece of wood is cut in the ratio 3:7. If the wood is 1.5m long, the length of the shorter piece is _____. (1)
- (ii) The factors of the expression $x^2 - 5x + 6$ are _____ and _____. (2)
- (iii) The only odd prime factor of 44 is _____. (1)
- (iv) $\log 15 =$ _____. (1)

Q1. (B) Answer the following:

- (i) If \vec{a} and \vec{b} are two non-zero vectors such that their scalar product is equal to zero, what can you say about the vectors? Give reasons. (1)
- (ii) Simplify $e^{\log x}$. (1)
- (iii) Can a rod of length 5m fit into a box of dimensions 4m, 3m and 2m? Give reasons for your answer. (3)

Q2. (A)

- (i) Using de Moivre's Theorem, prove that $\sin 2A = 2\sin A \cos A$ and $\cos 2A = \cos^2 A - 1$ (5)
- (ii) Solve by Cramer's rule: $x + 4y + 2z = 7$, $8x = 13 - 4y - z$, $x + y + z - 2 = 0$ (5)

OR

Q2. (B)

- (i) Find the cube roots of $z = 1 + i$. (5)
- (ii) Find the inverse of the matrix $A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 5 & -1 \\ 3 & 1 & 4 \end{bmatrix}$ (5)

Q3. (A)

- (i) If $f(x) = x^2 - 2x + 5$; $0 \leq x < 5$ find $f(2)$, $f(-4)$, $f(0)$, $f(3)$, $f(5)$. (5)
- (ii) Differentiate $y = (5x^2 + \log x + e^x + 7)^9$ w.r.t. x (5)

OR

Q3. (B)

- (i) Discuss the continuity of the following function at $x = 2$ and $x = 4$:
$$f(x) = \begin{cases} x^2 - 4 & 0 \leq x \leq 2 \\ 3x + 2 & 2 < x \leq 4 \\ x^2 - 1 & 4 < x \leq 6 \end{cases}$$
 (5)
- (ii) Find $f'(x)$ when $f(x) = (2x-1)(x+3)$. What is the value of $f'(3)$? (5)

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- Q4. (A)
- (i) Simplify $\log_x 21 - \log_x 3 - \log_x 7$ (2)
 - (ii) Find three numbers in an A.P. whose sum is 30 and product is 840. (3)
 - (iii) Evaluate $\int [(5x + 8)^6 + (9x - 4)^{-1} + 16^{3x-5} + e^{2x}] dx$ (5)

OR

- Q4. (B)
- (i) If $x^{3q+5} = x^{25}$ find q. (2)
 - (ii) The sum of the first six terms of a G.P. is 9 times the sum of the first three terms. Find the common ratio. (3)
 - (iii) Evaluate $\int_0^2 (4-9x^2)^{-1/2} dx$ (5)

- Q5. (A)
- (i) Find the area of the triangle whose sides are given by $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{b} = 3\hat{i} - 2\hat{j} + \hat{k}$. (3)
 - (ii) A plane is flying at an altitude of 6km above sea level. It spots two boats A and B, on the sea. If the angles of depression of A and B from the plane are 60° and 30° respectively, calculate the horizontal distance between A and B. (3)
 - (iii) Find the equation of the line through (7, -3) and parallel to the line through (-1, 2) and (5, 11). (4)

OR

- Q5. (B)
- (i) Find the unit vector perpendicular to the vectors $\vec{a} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{b} = 10\hat{i} - 2\hat{j} + 7\hat{k}$ (3)
 - (ii) Using trigonometry, prove the identity $\sin^2 \Theta + \cos^2 \Theta = 1$ (3)
 - (iii) Find m and n if (m, n+1) divides the line joining A(-3, 1) and B(-6, 7) externally in the ratio 2:1. (4)

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