Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST SEMESTER BSc. HEALTH SCIENCES DEGREE EXAMINATION - JULY 2024
SUBJECT: BHS-105 - PRE-CALCULUS
(RETAKE - OLD SCHEME)

Marks: 75　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**Duration: 180 mins.**

Answer all the questions.

Answer the following questions in short:

1A) If $f(x) = \sqrt{x}$ and $g(x) = \sqrt{2-x}$, find the function f o g. (2)

1B) Use the interval notation to list the values of X that satisfy the inequality for the following: (2)

i) $2x - 2 \geq 8$
ii) $-3x + 4 < 5$

1C) Find the standard form of the equation of the circle (i) Center (0,2) and radius 3 (ii) Center (-1, -2) and radius 2. (2)

1D) If $f(x) = 4x^2 + 1$, find $f(2 + \sqrt{3})$ and $f(2x)$ (2)

1E) Solve for x, given $(\log_{10} x)^2 - (\log_{10} x) - 6 = 0$ (2)

1F) Find the distance between and midpoint of the line segments joining the points (2, 4) and (-1, 3). (2)

1G) Let $f(x) = 2x - 3$ and $g(x) = x^2 + 2$. Evaluate $g\left(g\left(-\frac{1}{2}\right)\right)$. (2)

1H) Prove that $\dfrac{1}{1+\cos A} + \dfrac{1}{1-\cos A} = 2\cosec^2 A.$ (2)

1I) Solve the $\triangle ABC$ given that $a = 5, b = 5\sqrt{3}$ and c = 5. (2)

1J) Determine the value tan of 15° (2)

1K) Simplify $\left(\dfrac{35\,x^3 y^5}{63\,x^{-4} y^4} \right)^2.$ (2)

1L) Suppose Rs. 1000 is invested at 10% interest and the interest rate remains fixed for 8 years. (2)
Determine the value of the investment if the interest is compounded semiannually and quarterly.

1M) Using properties of logarithm solve $2 \times 3^{-x} = 2^{3x}.$ (2)

1N) Determine the values of x that satisfy the expression (2)
$\log 3 + \log(2x - 1) = 2 \log(x + 1)$

Answer the following questions in brief:

2A) Use the quadratic formula to find the x - intercepts i) $y = 6x^2 - 5x + 1$ and ii) (3)

$y = 12x^2 + x - 1.$

2B) Determine the equation of the parabola that satisfies the given condition for the following (i) Focus (3)
at (-2, 2), directrix y= -2 (ii) vertex at (-2, 2), directrix x=2 (iii) Vertex at (-2, 2), focus at (-2, 4).

2C) Prove that $\sin 3A = 3 \sin A - 4 \sin^3 A.$ (3)

2D) If $\cos A = \dfrac{1}{7}$ and $\cos B = \dfrac{13}{14}$, where A and B are acute angle. Prove that $A - B = \dfrac{\pi}{3}.$ (3)

Answer the following questions.

3A) Find the quotient $Q(x)$ and the reminder $R(x)$ when the polynomial $P(x)$ is divided by the (5)

polynomial $D(x)$ for the following:

i) $P(x) = 3x^2 - 2x + 2, D(x) = x - 1$

ii) $P(x) = 3x^4 + 5x^3 - 5x^2 - 5x + 2, D(x) = x + 2$

3B) If $\sin\alpha = -\dfrac{5}{13}$, $\sin\beta = \dfrac{7}{25}$ and $\pi < \alpha < \dfrac{3\pi}{2}$, $\dfrac{\pi}{2} < \beta < \pi$. Find $\cos(\alpha + \beta)$ and **(5)** $\sin(\alpha - \beta)$.

------**End**------