DAE/IA-2016/06 FIRST YEAR

MATH-113 APPLIED MATHEMATICS – I

COMMON WITH AUTO-MOBILE & DIESEL, AUTO & FARM MACHINERY, AUTOMATION, ARCHITECTURE, CAST METAL & FOUNDRY, CHEMICAL, CIVIL, CMT, DIE & MOULD, FOUNDRY & PATTERN MAKING, FOOTWEAR, GLASS & CERAMICS HEAT VENTILATION, AIR CONDITIONING & REFRIGERATION, LEATHER, LAND & MINE SURVEYING, MINING, MECHANICAL, METALLURGY & WELDING, MECHATRONICS, PRECISION MECHANICAL & INSTRUMENT, PGA, PETROLEUM, PETROCHEMICAL, QUANTITY SURVEY, RAC, SUGAR, TEXTILE SPINNING, TEXTILE DYEING & PRINTING & TEXTILE WEAVING TECHNOLOGIES.

PAPER 'B' (Subjective)

Time: 2:30 Hours **SECTION – I** **Marks: 60**

Q.1: Write short answer to any Eighteen (18) questions: - $18 \times 2 = 36$

1. Define equilateral triangle.
2. What is the side of the equilateral triangle whose area is $9\sqrt{3}$ sq.cm.
3. Write the area and perimeter of a square of sides 'a'.
4. The diagonals of a rhombus are 40m and 30m. Find its area.
5. Find the interior angle of hexagon.
6. The perimeter of a regular hexagon is 12cm, find its area.
7. What is the area and circumference of circle.
8. The minute hand of a clock is 12cm long. Find the area which is described on the clock face between 6 A.M to 6:20 A.M.
9. If base of a field 50m and number of ordinates are 11, then find breadth of strip.
10. How many match box each 80mm by 75mm by 18mm can be packed into a box 72cm by 45cm by 60cm internally.
11. The volume of the cube is 95 cu.cm. Find the surface area and the edge of the cube.
12. Write the formula of total surface area of cylinder.
13. The diameter of the base of a right circular cylinder is 14cm and its height is 10cm. Find the volume of solid cylinder.
14. Find the volume of a pyramid whose base is an equilateral triangle of side 1m and whose height is 4m.
15. Find the volume of a pentagonal based pyramid whose area of base is 15 sq. cm and height is 15cm.
16. Find the cost of painting @ Rs.7.5 per sq. cm a conical spire 64cm in circumference at the base and 108cm in slant height.
17. How many lead balls, each of radius 1cm can be made from a sphere whose radius is 8cm.
18. Find 'α', so that $|\alpha i + (\alpha + 1)j + 2k| = 3$
19. Find the unit vector along the vector $4i - 3j - 5k$.
20. Find $\left(\vec{a} + \vec{b}\right).\left(\vec{a} - \vec{b}\right)$ if $\vec{a} = 2i + 2j + 3k$, $\vec{b} = 2i - j + k$
21. Define vector product.
22. If $\vec{a} = 2i + 3j + 4k$, $\vec{b} = i - j + k$, find $|\vec{a} \times \vec{b}|$
23. Define diagonal matrix.
24. Show that $A = \begin{bmatrix} 2 & 3 & -1 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{bmatrix}$ is a singular matrix.
25. Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$
26. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, then find AB.
27. Find A^{-1} if $A = \begin{bmatrix} 5 & 3 \\ 1 & 1 \end{bmatrix}$

SECTION – II

Note: Attempt any three (03) questions. $3 \times 8 = 24$

Q.2: (a) Find the area of the triangle whose sides are in the ratio 9 : 40 : 41 and whose perimeter is 180 meters.

(b) The difference between two parallel sides of a trapezoid is 8m. The perpendicular distance between them is 24m and the area of the trapezoid is 312 square meter. Find the two parallel sides.

Q.3: (a) What is the length of the side and area of the largest hexagon that can be cut from 8cm round bar.

(b) Find the area of the field, whose ordinates are 0, 20, 22.5, 33.5, 45, 42, 33.5, 25.5 and 0 meter respectively. The width of each strip is 14m. Find the approximately cost of purchasing the field at a cost of Rs. 5,000 per meter.

Q.4: (a) A regular hexagonal pyramid has the perimeter of its base 12cm and its altitude is 15m. Find its volume.

(b) The radius of the base of a right circular cone is 6m and the slant height is 6.5m, find the volume and the lateral surface area.

Q.5: (a) Given the vectors $\vec{a} = 3i - 2j + 4k$ & $\vec{b} = 2i + j + 3k$. Find the magnitude and direction cosines of $\vec{a} - \vec{b}$.

(b) Find the sine of the angle and unit vector perpendicular to each:

$\vec{a} = 2i - j + k$ and $\vec{b} = 3i + 4j - k$

Q.6: Use Cramer's rule to solve the following system of equations:

$x + y + z = 0$, $2x - y - 4z = 15$, $x - 2y - z = 7$

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