DAE/IIA-2017/06 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. Find the area of right triangle if base and altitude are 20m and 10m respectively.
2. Find the area of triangle with sides 5, 4 and 3 meters respectively.
3. Find the base of a parallelogram whose area is 256sq.cm and height 32cm.
4. Define a rhombus.
5. Write the formula of area of a regular polygon of $'n'$ sides when the radius of inscribed circle $'r'$ is given.
6. The perimeter of a regular hexagon is 12cm, find its area.
7. Find the radius of a circle the area of which is 9.3129 sq.cm.
8. Define area of the Annulus (Ring).
9. Find the area of cross-section of river along a line where the depths at equal interval of 10m are noted 0, 7, 11, 15, 0 meters respectively.
10. The base of a right prism is an equilateral triangle with a side of 4cm and its height is 25cm, find its volume.
11. The inside measurement of a room are 8.5m, 6.4 and 4.5m height. How many men should sleep in the room, if each man is allowed 13.6 cu. m of air?
12. The diameter of the base of a right circular cylinder is 14cm and its height is 10cm. Find the volume of cylinder.
13. Find the diameter of the cylinder if its volume is 704cm^3 and height is 14cm.
14. Define pyramid.
15. Find the volume of a pyramid with a square base of side 10cm and height 15cm.
16. Find the volume of the largest cone that can be cut out of a cube whose edge is 3cm.
17. How many square meter of copper will be required to cover a hemi-spherical dome of 30m diameter.
18. Given the vectors: $\vec{a} = 3i - 2j + k$, $\vec{b} = 2i - 4j - 3k$, $\vec{c} = -i + 2j + 2k$ Find $\vec{a} + \vec{b} + \vec{c}$
19. Given the vectors $\vec{a} = 3i + j - k$ and $\vec{b} = 2i + j - k$, find magnitude of $3\vec{a} - \vec{b}$.
20. Find $\vec{a} \cdot \vec{b}$ if $\vec{a} = i + 2j + 2k$ & $\vec{b} = 3i - 2j - 2k$.
21. For what value of $'\lambda'$, the vectors $2i - j + 2k$ & $3i + 2\lambda j$ are perpendicular.
22. Find scalar $'x'$ and $'y'$ such that $x(i + 2j) + y(3i + 4j) = 7i + 9j$
23. Define scalar matrix.
24. Find $'x'$ and $'y'$ if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix} = \begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$
25. Without expansion, verify that: $\begin{vmatrix} \alpha & \beta+\gamma & 1 \\ \beta & \gamma+\alpha & 1 \\ \gamma & \alpha+\beta & 1 \end{vmatrix} = 0$
26. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ then find AB.
27. If $\begin{bmatrix} 2 & 3 \\ 4 & k \end{bmatrix}$ is singular, then find $'k'$.

SECTION – II

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

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

(b) Find the sine and the unit vector perpendicular to each : $\vec{a} = i + j + k$ and $\vec{b} = 2i + 3j - 4k$.

Q.3. Solve by Cramer's Rule:

$$x - 2y + z = -1$$
$$3x + y - 2z = 4$$
$$y - z = 1$$

Q.4. (a) From the point within an Equilateral triangle perpendicular are drawn to the three sides are 6, 7 and 8cm respectively. Find the area of triangle.

(b) Find area of an irregular figure by Simpson's Rule if the ordinates are 9, 11, 13, 12, 10, 13, 15, 17, 14, 12, 7 meters and base is 73 meters.

Q.5. (a) A regular decagon is inscribed in a circle the radius of which is 10cm. Find the area of the decagon.

(b) The radius of a right circular cylinder is 25cm and its height is 15cm. Find its volume, lateral surface and the whole surface area.

Q.6. (a) Find the volume and the total surface area of a cone of radius 6.6cm and height of 12.5cm.

(b) Two spheres each a 10m diameter are melted down and recast into a cone with a height equal to the radius of its base. Find the height of the cone.

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