

DAE/IIA-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 × 2 = 36

1. What is the side of the equilateral triangle whose area is $9\sqrt{3}$ sq.cm.
2. Find the area of triangle with sides 5, 4 and 3 meters respectively.
3. The sides of a cyclic quadrilateral are 75, 55, 140 and 40m, find its area.
4. The area of a rectangle is 20 sq.cm and one of its side is 4cm long. Find its breadth.
5. Write the formula to find the angle of a regular polygon of n sides.
6. Define inscribed polygon.
7. A path 14cm wide, surrounds a circular lawn whose diameter is 360cm. Find the area of the path.
8. Find the area of a segment, the chord of which is 8cm with a height of 2cm.
9. The dimension of a marriage hall are 100m, 50m and 18m respectively, find volume of the hall.
10. Find surface area of cube of volume 64cm^3 .
11. Find the diameter of the cylinder if its volume is 704cm^3 and height is 14cm.
12. A square pyramid has a volume of 60cu.cm and the side of the base is 6cm. Find the height of the pyramid.
13. Find the volume of the largest cone that can be cut out of a cube whose edge is 3cm.
14. Write formula of curved surface area of cone and slant height of cone.
15. How many square meter of copper will be required to cover a hemi-spherical dome of 30m diameter.
16. Write the formula of volume of sphere and hemi-sphere.
17. A brick measures 18cm by 9cm by 6cm, find the number of bricks that will be needed to build a wall 4.5cm wide, 18cm thick and 3.6cm high.
18. Find the unit vector parallel to the sum of the vector. $\vec{a} = [2, 4, -5]$ and $\vec{b} = [1, 2, 3]$
19. Find $\vec{a} \cdot \vec{b}$ if $\vec{a} = i + 2j + 2k$ & $\vec{b} = 3i - 2j - 2k$
20. Find the area of parallelogram with adjacent sides, $\vec{a} = 7i - j + k$ & $\vec{b} = 2j - 3k$
21. For what value of λ , the vectors $2i - j + 2k$ & $3i + 2\lambda j$ are perpendicular.
22. Given the vectors $\vec{a} = 3i + j - k$ and $\vec{b} = 2i + j - k$, find magnitude of $3\vec{a} - \vec{b}$.
23. Define Diagonal 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. Find the inverse of $\begin{bmatrix} 2 & 1 \\ 6 & 3 \end{bmatrix}$
26. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ then find AB.
27. What is the cofactor of 4 in matrix $\begin{bmatrix} 3 & 1 & -4 \\ 2 & 5 & 4 \\ 1 & 4 & 8 \end{bmatrix}$

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)** A rectangular field is 13m long and 10m wide. It has a cement path 3.5m wide around it. What is the area of the cement path?
- Q.3. (a)** A regular Octagon circumscribes a circle of 2cm radius. Find the area of the octagon.
- (b)** The area of two concentric circles are 1386sq.cm and 1886.5 sq.cm respectively. Find the width of the ring.
- Q.4. (a)** Find area of an irregular figure by Simpson's rule if the ordinates are 9, 11, 13, 12, 10, 13, 15, 17, 14, 12 and 7 meters and base 73 meters.
- (b)** The curved surface of a cylinder is 1000sq.m and the diameter of the base is 20m. Find the volume and height of the cylinder.
- Q.5. (a)** Given the vectors $\vec{a} = 3\vec{i} - 2\vec{j} + 4\vec{k}$ and $\vec{b} = 2\vec{i} + \vec{j} + 3\vec{k}$ find the magnitude and direction cosines of $3\vec{a} - 2\vec{b}$.
- (b)** Find the cosine of the angle between the vectors $\vec{a} = 2\vec{i} - 8\vec{j} + 3\vec{k}$ and $\vec{b} = 4\vec{j} + 3\vec{k}$.
- Q.6. (a)** Prove that:
$$\begin{bmatrix} a+\lambda & b & c \\ a & b+\lambda & c \\ a & b & c+\lambda \end{bmatrix} = \lambda^2(a+b+c+\lambda)$$
- (b)** Find the inverse of
$$\begin{bmatrix} 0 & -2 & -3 \\ 1 & 3 & 3 \\ -1 & -2 & -2 \end{bmatrix}$$