

Section-A

Multiple Choice Questions

Q. 1 Choose the correct answer for each from the given options:

(i) If $A \supseteq B$ then $A \cup B =$ _____

- (a) A (b) B (c) $\emptyset$ (d) U

(ii) The mean proportional between a and b is _____

- (a) $\sqrt{ab}$ (b) ab (c) a/b (d) $-ab$

(iii) For matrix A, $(A^t)^{-1} =$ _____

- (a) A^2 (b) A (c) A^{-1} (d) A^2

(iv) If α, β are the roots of $x^2 - 2x - 15 = 0$, then the value $\alpha^2 + \beta^2 =$ _____

- (a) 34 (b) -34 (c) 26 (d) -26

(v) An improper fraction can be reduced into proper fraction by _____

- (a) Addition (b) Multiplication (c) Subtraction (d) Division

(vi) The ungrouped data must be ordered first to find _____

- (a) A.M (b) Mode (c) Median (d) Range

(vii) If 5 cm and 12 cm are two sides of a right angled triangle. Then hypotenuse is: _____

- (a) 16 cm (b) 15 cm (c) 14 cm (d) 13 cm

(viii) Two equilateral triangles are also _____

- (a) Congruent (b) Similar (c) Proportional (d) Equivalent

- (v) Inscribed angle of _____ is obtuse.
(a) Minor arc (b) Major arc (c) Semi-circle (d) All of these
- (vi) Angle between tangent and radial segment at the point of contact is angle.
(a) Right (b) Obtuse (c) Acute (d) Reflex
- (vii) The sum of central angles of all the arcs of a circle is _____.
(a) 90° (b) 108° (c) 120° (d) 135°
- (viii) The ungrouped data must be ordered first to find
(a) A.M (b) Mode (c) Median (d) Range
- (ix) If 5 cm and 12 cm are two sides of a right angled triangle. Then hypotenuse is:
(a) 16 cm (b) 15 cm (c) 14 cm (d) 13 cm
- (x) Two equilateral triangles are also
(a) Congruent (b) Similar (c) Proportional (d) Equivalent
- (xi) Inscribed angle of _____ is obtuse.
(a) Minor arc (b) Major arc (c) Semi-circle (d) All of these
- (xii) Angle between tangent and radial segment at the point of contact is angle.
(a) Right (b) Obtuse (c) Acute (d) Reflex
- (xiii) The maximum number of common tangents between two circles touching externally is _____.
(a) 0 (b) 1 (c) 2 (d) 3
- (xiv) Diameter divides the circle into _____ parts.
(a) Two (b) Three (c) Four (d) All of these
- (xv) Each interior angle of regular hexagon is equal to _____.
(a) 90° (b) 108° (c) 120° (d) 135°
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Section-B

Note: Solve any EIGHT of the following questions. Each question carries 04 marks

Q.2 Verify the commutative property of union for the set:

$$A = \{a, b, c, d, e\} \text{ and } B = \{a, e, b, d\}$$

Q.3 Find the value of "a" if the ratios $3a + 4 : 2a + 5$ and $4:3$ are equal,

Q.4 Prove that $a:b=c:d$ if $a^2 - b^2 : a^2 + b^2 = ac : bd$

Q.5 For what values of p and q the roots of quadratic equation $x^2 + (2p - 4)x - (3q + 5) = 0$

Q.6 Solve the systems of equation, $2x + y = 3$ and $x + y^2 = 2$

Q.7 Show that the diameters of a circle bisect each other.

Q.8 Find the values of x and y if $(x - 5, 10) = (14, -7)$

Q.9 For what value of x, the matrix $\begin{bmatrix} 5 - x & x + 1 \\ 2 & 4 \end{bmatrix}$ is singular?

Q.10 Find all the cube roots of 64.

Q.11 If $A = \{1, 2\}$, $B = \{2, 3\}$ and $C = \{1, 3, 5\}$, then find (i) $A \times B$ (ii) $A \times (B \cup C)$

Q.12 Find the value of m, if the roots of the equation $x^2 - 5x + 2m = 0$ differ by 1.

Q.13 How far from centre of the radius 3 cm, a tangent segment of length 10 cm can be drawn?

SECTION-C

NOTE: Solve any FOUR of the following questions. Each question carries 07 marks.

Q.14 Verify De Morgan's Laws using Venn diagram if $A = \{1, 3, 5, 7, 9\}$, $B = \{5, 6, 7, 8\}$ and $U = \{1, 2, 3, \dots, 10\}$

Q.15 Find the solution by matrix inversion method rule $2x + y \leq 14$
 $-4x + y = 28$

Q.16 Show that $(1 - \omega)(1 + \omega^2)(1 + \omega^4)(1 + \omega^8) = (\omega + \omega^2)^4$

Q.17 The length of sides of triangle, $a=16$, $b=30$ and $c=34$, verify that the triangle is right triangle.

Q.18 Resolve $\frac{6x - 5}{(x^2 + 10)(x + 1)}$ into partial fractions.

Q.19 Prove that, if a line is drawn perpendicular to a radial segment of a circle at its outer end point, it is tangent to the circle at that point.

SECTION - A

Multiple Choice Questions

Q. 1 Choose the correct answer for each from the given options.

- (i) The magnitude of force between two unit charges when the distance between them is 1 meter would be:
(a) 0.N (b) 1 N (c) 2 N (d) Coulmb's Constant
- (ii) If the area of the parallel plate capacitor is doubled then the capacitance will be:
(a) Remain uncharged (b) half (c) Double (d) Four times

(iii) In an Electric circuit when Electrons move from low to high potential they will.

- (a) Gain Energy (b) Lose their identity
(c) Lose Energy (d) Gain potential

(iv) Oscillation are damped due to the presence of:

- (a) Linear motion (b) Restoring force
(c) Frictional Force or Mechanical Force

(v) In an oscillating pendulum, the bob accelerates from its extreme position due

- (a) Inertia (b) Tension in the string (c) Wind (d) Gravitational force

- (x) Which type of wave can not travel through a Vacuum
(a) Sound Waves (b) Infra-red radiation
(c) Microwaves (d) X-rays
- (xi) Sound is a form of:
(a) Electrical energy (b) Mechanical energy
(c) Thermal energy (d) chemical energy
- (xii) Ohm's law is not applicable to:
(a) Semi-conductors (b) D.O circuit (c) Small resistors
(d) High current
- (xiii) The direction of induced e.m.f in a circuit is accordance with conservation of:
(a) Mass (b) charge (c) momentum (d) energy
- (xiv) The splitting of a heavy nucleus into smaller nuclei is called:
(a) Fusion (b) Fission (c) Half-life (d) Gamma-decay
- (xv) The type of electromagnetic wave used in security scanners at night is:
(a) Infra-red (b) Microwaves (c) Radio waves (d) X-rays
- (xvi) The color that is least deviated by a prism.
(a) Violet ray (b) Green ray (c) Red ray (d) Yellow ray

Section-B

(Short Answers)

Note: Answer any EIGHT of the following questions. Each question carries 03 marks.

- Q.2 Define the term transverse wave.
- Q.3 Derive the formula of Wave speed, $V =$
- Q.4 How is the sound produced?
- Q.5 Define, Infrasonic and Ultra Sound.
- Q.6 Calculate the speed of sound in air at 50°C ? Given that speed of sound at 0°C is 331m/sec .
- Q.7 Define dispersion of light

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- Q.8 What are electromagnetic waves?
 - Q.9 Why is a normal eye not able to see the object put closer than 2.5cm .
 - Q.10 What is the electric force of repulsion between two electrons at a distance of 1m ?
 - Q.11 Determine the function of transformers in the process of moving electrical current from the power plant to your home.
 - Q.12 What do you understand by the half life of a radioactive element.
 - Q.13 Describe the structure of an atom.

SECTION - C

Descriptive Answers

Note: Answer any FOUR of the following questions. Each question carries 06 marks.

- Q.14 List the physical properties of different isotopes of an element that are different.
- Q.15 What is Internet? And also differentiate between Data and Information,
- Q.16 A wire carrying 4A current and has length of 15cm between the poles of a magnet is kept at an angle of 30° to the uniform field of 0.8 T. Find the force acting on the wire.
- Q.17 Explain how an electroscope is built and how it operates.
- Q.18 What do you understand by the term total internal reflection?
- Q.19 Write notes on any TWO of the following:
- (a) Electrostatic Potential
 - (b) Parallel Combination Circuit
 - (c) Simple Harmonic motion