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2022-01-02

1. Kerosene oil rises up the wick in a lantern

Due to surface tension of the oil

The wick attracts the kerosene oil

Of the diffusion of the oil through the wick

None of the above

2. A cell of e.m.f. 1.5 V having a finite internal resistance is connected to a load resistance of  $2\Omega$ . For maximum power transfer the internal resistance of the cell should be

4 ohm

2 ohm

0.5 ohm

0 ohm

3. A ball is rolled off the edge of a horizontal table at a speed of 4 m/second. It hits the ground after 0.4 second. Which statement given below is true?

It hits the ground at a horizontal distance 1.6 m from the edge of the table

The speed with which it hits the ground is 4.0 m/second

Height of the table is 1.0 m

It hits the ground at an angle of  $60^\circ$  to the horizontal

4. A light and a heavy body have equal momenta. Which one has greater K.E.

The light body

The heavy body

The K.E. are equal

Data is incomplete

5. A solid cylinder of mass 2 kg and radius 4 cm rotating about its axis at the rate of 3 rpm. The torque required to stop after  $2\pi$  revolutions is

$2 \times 10^{-6} \text{ Nm}$

$2 \times 10^{-3} \text{ Nm}$

$12 \times 10^{-4} \text{ Nm}$

$2 \times 10^6 \text{ Nm}$

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6. In a water-fall the water falls from a height of 100 m. If the entire K.E. of water is converted into heat, the rise in temperature of water will be

0.23°C

0.46°C

2.3°C

0.023°C

7. An inductor 20 mH, a capacitor 100  $\mu\text{F}$  and a resistor 50  $\Omega$  are connected in series across a source of emf,  $V = 10 \sin 314 t$ . The power loss in the circuit is

2.74 W

0.43 W

0.79 W

1.13 W

8. Two sources of equal emf are connected to an external resistance  $R$ . The internal resistances of the two sources are  $R_1$  and  $R_2$  ( $R_2 > R_1$ ). If the potential difference across the source having internal resistance  $R_2$  is zero, then

$$R = \frac{R_1 R_2}{R_1 + R_2}$$

$$R = \frac{R_1 R_2}{R_2 - R_1}$$

$$R = R_2 \frac{(R_1 + R_2)}{(R_2 - R_1)}$$

$$R = R_2 - R_1$$

9. Critical angle for light going from medium (i) to (ii) is  $\theta$ . The speed of light in medium (i) is  $v$  then speed in medium (ii) is

$$v(1 - \cos \theta)$$

$$v / \sin \theta$$

$$v / \cos \theta$$

$$v(1 - \sin \theta)$$

10. A rectangular vessel when full of water takes 10 minutes to be emptied through an orifice in its bottom. How much time will it take to be emptied when half filled with water

9 minute

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7 minute

5 minute

3 minute

11. A pendulum clock loses 12 s a day if the temperature is  $40^{\circ}\text{C}$  and gains 4 s a day if the temperature is  $20^{\circ}\text{C}$ . The temperature at which the clock will show correct time, and the co-efficient of linear expansion ( $\alpha$ ) of the metal of the pendulum shaft are respectively:

$30^{\circ}\text{C}; \alpha = 1.85 \times 10^{-3}/^{\circ}\text{C}$

$55^{\circ}\text{C}; \alpha = 1.85 \times 10^{-2}/^{\circ}\text{C}$

$25^{\circ}\text{C}; \alpha = 1.85 \times 10^{-5}/^{\circ}\text{C}$

$60^{\circ}\text{C}; \alpha = 1.85 \times 10^{-4}/^{\circ}\text{C}$

12. A pendulum clock keeps correct time at  $0^{\circ}\text{C}$ . Its mean coefficient of linear expansions is  $\alpha/^{\circ}\text{C}$ , then the loss in seconds per day by the clock if the temperature rises by  $t^{\circ}\text{C}$  is

$$\frac{\frac{1}{2}\alpha t \times 864000}{1 - \frac{\alpha t}{2}}$$

$$\frac{1}{2}\alpha t \times 86400$$

$$\frac{\frac{1}{2}\alpha t \times 86400}{\left(1 - \frac{\alpha t}{2}\right)^2}$$

$$\frac{\frac{1}{2}\alpha t \times 86400}{1 + \frac{\alpha t}{2}}$$

13. A triangle with vertices (4,0), (-1,-1), (3,5) is

isosceles and right angled

isosceles but not right angled

right angled but not isosceles

neither right angled nor isosceles

14. If  $A$  is a column matrix, then,  $AA^T$  is

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a singleton matrix

a square matrix

a symmetric matrix

a symmetric square matrix

15.

$$\frac{(a-1) - \frac{(a-1)^2}{2} + \frac{(a-1)^3}{3} - \dots \infty}{(b-1) - \frac{(b-1)^2}{2} + \frac{(b-1)^3}{3} - \dots \infty} =$$

$\log_b a$

$\log_a b$

$\log_e a - \log_e b$

$\log_e a + \log_e b$

16.  $\begin{vmatrix} 19 & 17 & 15 \\ 9 & 8 & 7 \\ 1 & 1 & 1 \end{vmatrix} =$

0

187

354

54

17.If the sum of first  $n$  odd numbers is  $A$  and the sum of first  $n$  even numbers is  $B$  then:

$A - B = n$

$B - A = n$

$B = A + \sqrt{A}$

both (b) and (c)

18.For specifying a straight line how many geometrical parameters should be known?

1

2

3

4

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19.If  $|a| = 3$ ,  $|b| = 4$  and the angle between  $a$  and  $b$  be  $120^\circ$ , then  $|4a + 3b| =$

25

12

13

7

20.If  $A$  is a  $p \times q$  matrix and  $B$  is another matrix such that  $AB$  and  $BA$  are both defined, then  $B$  has

$p$  rows and  $q$  columns

$q$  rows and  $p$  columns

$p$  rows and  $p$  columns

$q$  rows and  $q$  columns

21.The slope of tangent to the curve  $y^2 = x^2$  at the origin is:

1

-1

1 or -1

none of these

22.The equation of pair of tangents to the circle  $x^2 + y^2 - 2x + 4y + 3 = 0$  from  $(6, -5)$ , is

$$7x^2 + 23y^2 + 30xy + 66x + 50y - 73 = 0$$

$$7x^2 + 23y^2 + 30xy - 66x - 50y - 73 = 0$$

$$7x^2 + 23y^2 - 30xy - 66x - 50y + 73 = 0$$

none of these

23.The equation of the lines which passes through the point  $(3, -2)$  and are inclined at  $60^\circ$  to the line  $\sqrt{3}x + y = 1$  are:

$$y + 2 = 0, \sqrt{3}x - y - 2 - 3\sqrt{3} = 0$$

$$x - 2 = 0, \sqrt{3}x - y + 2 + 3\sqrt{3} = 0$$

$$\sqrt{3}x - y - 2 - 3\sqrt{3} = 0$$

None of these

24.If  $f(x) = \begin{cases} 1 + x^2, & \text{when } 0 \leq x \leq 1 \\ 1 - x, & \text{when } x > 1 \end{cases}$  then

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$$\lim_{x \rightarrow 1^+} f(x) \neq 0$$

$$\lim_{x \rightarrow 1^-} f(x) \neq 2$$

$f(x)$  is discontinuous at  $x=1$

none of these

25. If  $\alpha \neq \beta$  but  $\alpha^2 = 5\alpha - 3$  and  $\beta^2 = 5\beta - 3$  then the equation having  $\alpha/\beta$  and  $\beta/\alpha$  as its roots is

$$3x^2 - 19x + 3 = 0$$

$$3x^2 + 19x - 3 = 0$$

$$3x^2 - 19x - 3 = 0$$

$$x^2 - 5x + 3 = 0$$

26.

$$\frac{1 + \frac{2^2}{2!} + \frac{2^4}{3!} + \frac{2^6}{4!} + \dots \infty}{1 + \frac{1}{2!} + \frac{2}{3!} + \frac{2^2}{4!} + \dots \infty} =$$

$$e^2$$

$$e^2 - 1$$

$$e^{3/2}$$

None of these

27. If  $y = e^{x+e^{x+e^{x+\dots\infty}}}$ , then  $\frac{dy}{dx} =$

$$\frac{y}{1-y}$$

$$\frac{1}{1-y}$$

$$\frac{y}{1+y}$$

$$\frac{y}{y-1}$$

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28.  $\frac{d}{dx} \left\{ \cos^{-1} \left( \frac{1-x^2}{1+x^2} \right) \right\} =$

$\frac{1}{1+x^2}$

$-\frac{1}{1+x^2}$

$-\frac{2}{1+x^2}$

$\frac{2}{1+x^2}$

29. Bonds present in sulphuric acid is/are

Covalent only

Ionic and covalent

Covalent and co-ordinate covalent

Ionic, covalent and co-ordinate covalent

30. The flux used during extraction of copper from copper pyrite is

$CaO$

$CaCO_3$

$P_2O_5$

$SiO_2$

31. Dilute aqueous  $KMnO_4$ , at room temperature reacts with  $R-CH=CH-R$  to give

$R-CHO$

$R-COOH$

$RCHOH-CHOHR$

$CO_2 + H_2O$

32. Dissociation of  $H_3PO_4$  occurs in \_\_\_\_\_ stages

1

2

3

4

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33. A metallic carbide on treatment with water gives a colourless gas which burns readily in air and gives a precipitate with ammoniacal silver nitrate solution. Gas evolved is

Methane

Ethane

Acetylene

Ethylene

34. An unknown compound A has a molecular formula  $C_4H_6$ . When A is treated with an excess of a new substance B with formula  $C_4H_6Br_4$  is formed. A forms a white precipitate with ammoniacal silver nitrate solution. A may be

Butyne-1

Butyne-2

Butene-1

Butene-2

35. 0.16 gm of a dibasic acid required 25 ml of decinormal  $NaOH$  solution for complete neutralization. The molecular weight of the acid is

32

64

128

256

36. A gas  $X$  is formed by catalytic oxidation of sulphur dioxide.  $X$  reacts with sulphuric acid to give

$H_2S_2O_3$

$H_2S_4O_6$

$H_2S_2O_7$

$H_2S_2O_8$

37. The antonym of 'dearth' is:

scarcity

shortage

paucity

abundance



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38.The synonym of 'loquacious' is:

talkative

beautiful

thirsty

complicated

39.The antonym of 'burgeoning' is:

growing

retarding

dipping

unique

40.My salary is as much as \_\_\_\_.

she

her

hers

all of above