1. An ideal gas has pressure 'P', volume 'V' and absolute temperature 'T'. If 'm' is the mass of each molecule and 'K' is the Boltzmann constant then density of the gas is[MHT-CET 2017]

(a) $\frac{Pm}{KT}$ (b) $\frac{KT}{Pm}$ (c) $\frac{Km}{PT}$ (d) $\frac{PK}{Tm}$

2. A nucleus is bombarded with a high speed neutron so that resulting nucleus is a radioactive one. This phenomenon is called

(a) Artificial radioactivity (b) Fusion (c) Fission

(d) Radioactivity

3. In the figure given below, what is the value of resistance X, when the potential difference between

B and D is zero ?
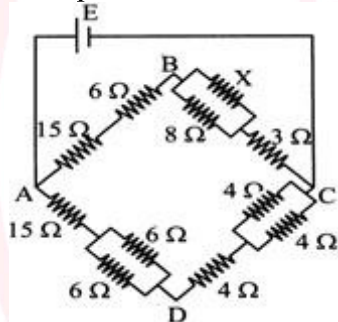
(a) 4 ohm (b) 6 ohm (c) 8 ohm (d) 9 ohm

4. A circuit has a resistance of $12\,\Omega$ and an impedance of $15\,\Omega$. The power factor of the circuit will be

(a) 0.8 (b) 0.4 (c) 1.25 (d) 0.125

5. Same current is flowing in two alternating circuits. The first circuit contains only inductance and the other contains only a capacitor. If the frequency of the emf of AC is increased, the effect on the value of the current will be[MHT-CET 2009]

(a) increases in the first circuit and decreases in the other

(b) increases in both the circuits

(c) decreases in both the circuits

(d) decreases in the first circuit and increases in the other

6. Figure shows the variation of force acting on a body with time. Assuming the body to start from rest, the variation of its momentum with time is best represented by which plot?

(a) (b)

(c)

(d)
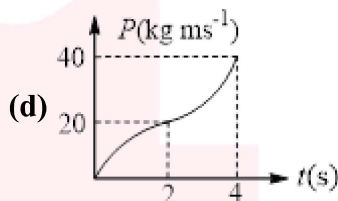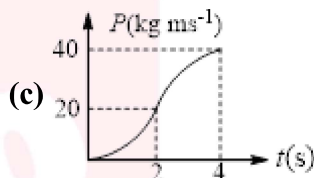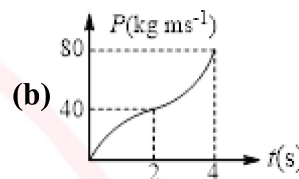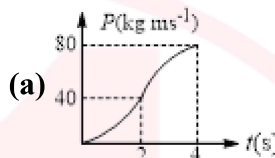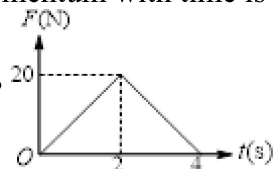
7. In an n-type semiconductor, the concentration of minority carriers mainly depends upon

(a) Doping technique (b) Number of donor atoms

(c) Temperature of the material

(d) Quality of intrinsic material

8. Electromeric effect is

(a) Permanent effect (b) Temporary effect

(c) Resonance effect (d) Inductive effect

9. Which of the following has most acidic hydrogen?

(a) 3-hexanone (b) 2, 4-hexanedione

(c) 3, 4-hexanedione (d) 2, 3-hexanedione

10. For the preparation of tertiary butyl ethyl ether, the reaction preferred is_____

(a) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-O^-\,Na^+ + Br-CH_2CH_3 \longrightarrow$

(b)

$$CH_3CH_2O^-Na^+ + Br-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 \longrightarrow$$

(c)

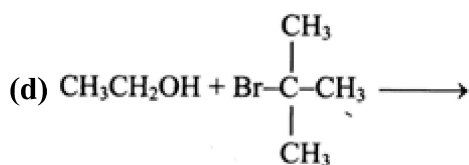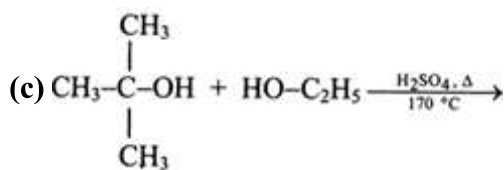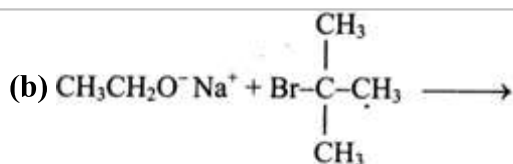$$CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-OH + HO-C_2H_5 \xrightarrow[170\,°C]{H_2SO_4,\,\Delta}$$

(d)

$$CH_3CH_2OH + Br-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3 \longrightarrow$$
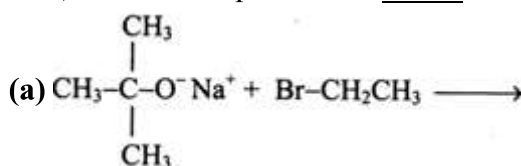
11. The pressure and temperature of $4dm^3$ of carbon dioxide gas are doubled, then the volume of carbon dioxide gas would be

(a) $2\,dm^3$ **(b)** $3\,dm^3$ **(c)** $4\,dm^3$ **(d)** $8\,dm^3$

12. An example of a pseudo first order reaction is

(a) Dissociation of hydrogen iodide

(b) Hydrolysis of methyl acetate in dilute solution

(c) Dissociation of phosphorus pent chloride

(d) Decomposition of hydrogen peroxide

13. The pH of the mixture of acetic acid and potassium acetate will be

(a) 0 **(b)** 7 **(c)** less than 7 **(d)** more than 7

14. Which of the following is an intensive property?

(a) Volume **(b)** Enthalpy **(c)** Surface tension

(d) Free energy

15. If $4ab = 3h^2$, then the ratio of the slopes of the lines represented by $ax^2 + 2hxy + by^2 = 0$ is

(a) $\sqrt{3}:1$ **(b)** $\sqrt{2}:1$ **(c)** $1:3$ **(d)** $2:1$

16. $\int \dfrac{dx}{5x^2+7} =$

(a) $\dfrac{1}{\sqrt{35}}\tan^{-1}\left(\dfrac{\sqrt{5}x}{\sqrt{7}}\right)+c$ **(b)** $\dfrac{1}{5\sqrt{7}}\tan^{-1}\left(\dfrac{\sqrt{5}x}{\sqrt{7}}\right)+c$

(c) $\sqrt{\dfrac{5}{7}}\tan^{-1}\left(\dfrac{\sqrt{5}x}{\sqrt{7}}\right)+c$ **(d)** $\dfrac{5}{\sqrt{7}}\tan^{-1}\left(\dfrac{\sqrt{5}x}{\sqrt{7}}\right)+c$

17. Direction of zero vector

(a) Does not exit **(b)** Is towards origin

(c) Is indeterminate **(d)** None of these

18. The approximate value of $(4.01)^5$ is

(a) 1036.08 **(b)** 1036.06 **(c)** 1036.80 **(d)** 1036.60

19. The inverse of $\begin{bmatrix} 1 & \sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$ is :

(a) $\begin{bmatrix} 1 & -\sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$ **(b)** $-\sec^2\alpha\begin{bmatrix} 1 & -\sin\alpha \\ \sin\alpha & -1 \end{bmatrix}$

(c) $\sec^2\alpha\begin{bmatrix} 1 & -\sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$

(d) $-\cos^2\alpha\begin{bmatrix} 1 & \sin\alpha \\ -\sin\alpha & -1 \end{bmatrix}$

20. If one of the line given by $ax^2 + 2hxy + by^2 = 0$ bisects the angle between the axes in the first quadrant, then

(a) $(a+b)^2 = 2h^2$ **(b)** $(a+b)^2 = 4h^2$ **(c)** $h^2\,ab = 0$

(d) $h^2 + ab = 0$

21. $\displaystyle\int_0^{\frac{\pi}{2}} \dfrac{\cos x}{(1+\sin x)(2+\sin x)}dx =$

(a) $\log\left(\dfrac{2}{3}\right)$ **(b)** $\log\left(\dfrac{3}{2}\right)$ **(c)** $\log\left(\dfrac{4}{3}\right)$ **(d)** $\log\left(\dfrac{3}{4}\right)$

22. $\displaystyle\lim_{h\to 0}\dfrac{(a+h)^2\sin(a+h)-a^2\sin a}{h}$ is equal to

(a) $2a\sin a$ **(b)** $a^2\cos a$ **(c)** $a^2\cos a + 2a\sin a$

(d) None of these