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Class-XII Common Pre-Board Examination-2013 - 14

Physics(Theory)-Marking Scheme

1. T = 24000 years t = 72000 years

   $\frac{N}{N_0} = \left[\frac{1}{2}\right]^{t/T} = (\frac{1}{2})^3 = \frac{1}{8}$ or 12.5% 1m
2. Unit: Am^2 1/2

   Direction: from S-pole to N-pole ½
3. 2 : 1 1m
4. No, since there is no change in magnetic flux due to steady current 1m
5. (a) equal (b) $n_x > n_r$ ½ + ½
6. focal length increases, power will decreases 1m
7. As $\lambda_b<\lambda_r$, $\mu_b>\mu_r$ 1m
8. No 1/2

   $\lambda = \frac{h}{mv}$ ½
9. Depletion region decreases when it is forward biased ½m

   Depletion region increases when it is reverse biased ½m

   Depletion region decreases with increase in concentration 1m
10. (i) length of antenna required is so large, practically impossible to set up.

    (ii)Energy radiated from the antenna in audio frequency range is nearly zero

    (iii) Audio signals from different stations gets inseparably mixed up.

    (any two) 2m
11. $I_s = \frac{E_S}{Z}$ = 22/220 = 0.1A 1m

    $E_pI_p = E_sI_s$

    I_p = 0.01A 1m

12. a.Due to a.c source in loop of coil P magnetic flux changes with time. Due to the mutual induction ,induced emf is produced in the coil Q. The bulb lights. 1m

    b. Decrease in mutual induction and hence a decrease in induced emf in the coil Q. Bulb B gets dimmer. 1m

13. Bqv = $\frac{mv^2}{r}$ 1m

    $r_1 = \frac{m_1v^2}{Bq_1}$

    $r_2 = \frac{m_2v^2}{Bq_2}$

$\frac{r_1}{r_2} = \frac{m_1/m_2}{q_1/q_2} = \frac{4}{2} = 2$ 1m

14. a. Paramagnetic materials have small positive susceptibility (I/H)

Ferromagnetic materials have large positive susceptibility ½

Material A is paramagnetic and B is Ferromagnetic. ½

b. Intensity of magnetization of B is very large. Hence large susceptibility 1m

15. a) $E_0 = cB_0 = 120$ N/c
b) $\omega = 2\pi\nu = 3.14 \times 10^8$ rad/s
c) $k = 2\pi/\lambda = 1.05$ rad/m
d) $\lambda = c/\nu = 6$m (½ each.)

16. $E = \frac{hc}{\lambda} = 4.5$ eV 1m

The photon of energy 4.5 eV will be emitted for corresponding to the transition B 1m

17. i)If the radius of the Gaussian surface were doubled, the electric flux will remain same. The same charge is enclosed in the two cases. 1m

ii) the charge is negative. 1m

iii) $q = \epsilon_0\phi = -8.854 \times 10^{-9}$C 1m

18. For correct principle 1m

For circuit diagram 1m

For explanation and formula 1m

19. A metal has positive temperature coefficient of resistance

A semiconductor has negative temperature coefficient of resistance 1m

On cooling resistance of Cu increases and for semiconductor decreases 1m

The conductivity of Cu decreases and for semiconductor increases 1m

OR

$R = \frac{4\rho.l}{\pi D^2}$ 1m

$R_1 = \frac{4\rho.2l}{\pi D^2}$

$R_2 = \frac{4\rho.3l}{\pi(2D)^2}$ 1m

$\frac{R_1}{R_2} = \frac{8}{3}$ 1m

20. Biot-Savert law expression 1m

For proper diagram and explanation 1m

For correct Expression 1m

21. any one difference 1m

for correct phasor diagram 1m

For correct derivation and expression 1m

22. For diagram & explanation 1m

For I vs δ graph 1m

For correct derivation 1m

23. For correct definition ½ + ½

For correct graph 1m

Slope = $\frac{h}{e}$ 1m

24. For correct definition 1m

For correct graph 1m

For salient features 1m

25. For correct definition of modulation 1/2m

Definition of amplitude modulation 1m

Waveform diagram 1m

Definition of modulation index 1/2m

26. i)Because the minimum reading distance is 25 cm and Prem's father had problem of reading the book. 1m

(ii) As the person wants to read at 25 cm, so if u = -25 cm then its image should by spectacle lens at v = -50 cm, so that the defective eye may focus it on retina.1m

$\frac{1}{f} = \frac{-1}{u} + \frac{1}{v}$ $\frac{1}{f} = \frac{-1}{-25} + \frac{1}{-50} = \frac{1}{50}$

F = +50 cm (convex lens) = 0.5 m

Power of the lens = $\frac{1}{f}$ = 2 D 1m

(iii) Compassion for others, caring nature. 1m

27. a) i) Derivation of electric potential at any point 2m

ii) Derivation of electric potential along axial line 1m

b) i) q_1 is positive ½ m

q_2 is negative ½ m

ii) Slope of the graph = $\frac{q}{4\pi\epsilon_0}$. As the magnitude of the slope of line due to charge q_2 is greater and hence q_2 is greater. 1m

OR

i) $C = \frac{\epsilon_0 A}{d - t(1 - \frac{1}{K})}$ 3m

ii) When a metallic slab of thickness t is introduced, then K = α

Then $C = \frac{\epsilon_0 A}{d - t}$ 1m

The capacitance will be more in case of metallic slab. 1m

28. For correct ray diagram 2m

For working and derivation 2m

For reason for low focal length objective lens. 1m

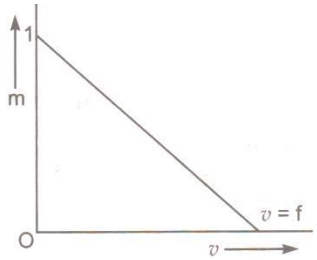
Or

Ray diagram 1m

For correct derivation 1m

For correct definition 1m

For correct graph 1m



$\frac{1}{f} = \frac{-1}{u} + \frac{1}{v}$ $\frac{v}{f} = \frac{-v}{u} + 1$ $\frac{v}{u} = 1 - -\frac{v}{f}$ m = $1 - -\frac{v}{f}$ m = $-\frac{v}{f} + 1$

At X-axis intercept, m= 0 = $-\frac{v}{f} + 1$ v = f 1m

29. For correct circuit diagram 2m

For correct graph 1m

For correct definition ½ + ½

(Cut off State: Transistor will be in cut off state when output current (I_c) is zero.

Transistor does not conduct.

Active state : When there is some current (I_c) in collector-emitter circuit , then the transistor is said to be in active state)

When transistor is used as a switch it does not remain in active state. 1m

OR

C_1 is output of AND gate having $\bar{A}$ and B as its two inputs. (with waveform) 1m

C_2 is output of AND gate having A and $\bar{B}$ as its two inputs (with waveform) 1m

The output Y is the output of an NOR gate having C_1 and C_2 as its two inputs

(with waveform) 2m

Output (Y) only when both the inputs A and B are alike. 1m