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ROLLNO ☐☐☐☐☐☐☐ **PHYSICS Class XII**

Time allowed: 3 hours *Maximum Marks: 70*

General Instructions:
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1. *All questions are compulsory. There are 26 questions in all.*
2. *This question paper has five sections: Section A, Section B, Section C, Section D and Section E.*
3. *Section A contains five questions of one mark each, Section B contains five questions of two marks each, Section C contains twelve questions of three marks each, Section D contains one value based question of four marks and Section E contains three questions of five marks each.*
4. *.There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all the three questions of five marks weight age. You have to attempt only one of the choices in such questions.*
5. *You may use the following values of physical constants wherever necessary.*

$c = 3 \times 10^8$ **m/s** $h = 6.6 \times 10^{-34}$ **Js** $e = 1.6 \times 10^{-19}$ **C** $N_A = 6.023 \times 10^{23}$ **/mole** $m_n = 1.67 \times 10^{-27}$ **kg**

SECTION A

1. Draw graph between inductive reactance and frequency for a c source connected with capacitor .
2. Given n resistors each of resistance R, how will you combine them to get the ratio of the maximum to minimum resistance
3. Draw the graph showing the distribution of kinetic energy of electrons emitted during beta decay.
4. Draw the graphical variation between stopping potential and frequency of incident light.
5. A partially plane polarized beam of light is passed through Polaroid. Show graphically the variation of the transmitted light intensity and angle of rotation of the Polaroid.

SECTION B

6. Two large metal plates of area 6.0 m^2 face each other .The plates are 3cm apart and carry equal and opposite charges on their inner surfaces. If electric field at a point between the plates is 5 x 10^4 N/C then calculate the magnitude of charge in each plate.
7. For what position of an electric dipole in a uniform electric field its potential energy is (i) minimum (ii) maximum?
8. An infinitely long straight conductor XY is carrying a current of 5A .An electron is moving with a speed of 10^5 m/s parallel to the conductor in air from point A to B in fig.The perpendicular distance between the electron and the conductor is 20cm.Calculate the magnitude of the force experienced by the electron. Write the direction of this force. Electron
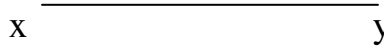
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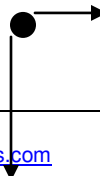
20cm
_____
x   y

10.   An air cored coil L and a bulb B are connected in series to the ac mains as shown in the figure .The bulb glows with some brightness. How would the glow of the bulb change if an iron rod were inserted in the coil? Give reasons in support of your answer.

11.   Obtain an expression for deviation suffered by a ray of light when refracted through a small angle prism.

Or

Explain with reason how the resolving power of a compound microscope will change when (i) frequency of incident light is increased.(ii) focal length of the objective lens is increased

SECTION C

12.   Name the constituent radiation of electromagnetic spectrum which

(a) is used to kill germs in water.

(b) is used at airport to clear fog and mist.

(c) is used in metero-stations to scan the objects

13.   Why zener diode is heavily doped .Write its two uses.

14.   Define demodulation .Draw the circuit diagram and write its one necessity

15.   Is it necessary for a transmitting antenna to be at the same height as that of the receiving antenna for line of sight communication? A TV transmitting antenna is 81m tall .How much service area can it cover if the receiving antenna is at the ground level?

16.   Derive an expression for dipole intensity at any point on equatorial line of short electric dipole. Is there any force and torque in an electric dipole in a non uniform electric dipole

17.   What is ideal voltmeter? A voltmeter with resistance 500Ω is used to measure the e.m.f of a cell of internal resistance 4Ω.Find the percentage error in the reading of the voltmeter

18.   Define internal resistance .A battery has an emf E and internal resistance r.A variable resistance R is connected across the terminals of the battery .Find the value of R such that

(a) the current in the circuit is maximum (b) the potential difference across the terminals is maximum.

19. Define the terms magnetic dip and magnetic declination with the help of relevant diagrams. The vertical component of earth's magnetic field at a place is $\sqrt{3}$ times the horizontal component .What is the value of angle of dip at this place?

20. Derive an expression for the torque on a rectangular coil of area A carrying current I placed in a magnetic field. Write its one application.

21. The eye piece and objective of a microscope having focal lengths of 0.3 m and 0.4m respectively are separated by a distance 0.2m .Now the eye piece and the objective are to be interchanged ,such that the angular magnification of the instrument remains same .What is the new separation between the lenses?

22. Explain total internal reflection .Write its two conditions. How it applicable in Optical fiber communication?   Or

    Write three conditions for the interference of light. Draw its Intensity and path difference graph.

23. Mention the significance of Davission - Germer experiment. Draw the related graph foe the wave nature of electrons.An α particle an a proton are accelerated from rest through the same potential difference V.Find the ratio of de broglie wavelengths associated them.

SECTION D

24. There are many dangers in the use of nuclear power plants .These have been a number of situations in which these dangers have become real disasters ,giving birth to safety and regulatory agencies.

    (a) Name three main dangers of nuclear power plants.
    (b) How should the nuclear powers conduct themselves to avert these dangers?
    (c) Which human value should be in focus while building nuclear power plants?

SECTION E

25. (i) Using the relation for refraction at a single spherical refracting surface, derive the lens maker's formula. Write the sign conventions(denser to rarer medium)
    (ii) A 35mm slide with a 24mm X 36mm picture is projected on screen placed 12 m from the slide .The image of the slide picture on the screen measure 1.0mX 1.5m. Determine the location of projection lens and its focal length
                        Or

State the condition for diffraction of light to occur. Draw the appropriate diagram. Derive the expression for the central fringe width. In the diffraction at single slit experiment, how the width and the intensity of central maximum change, if (i) slit width is halved (ii) visible light of longer wavelengths is used

26. Mention the factors on which the resonant frequency of a series LCR circuit depends .Plot a graph showing a variation of impedance of a series LCR circuit with the frequency of the applied a.c source. Derive the expression for the impedance in such circuit with phase diagram.

Or

Define one Henry. Two circular coils, one of small radius r_1 and the other of large radius r_2 .are placed coaxially with centers coinciding .Obtain the expression the coefficient of mutual inductance Write three factors on which coefficient of mutual inductance depends

27. A student has to study the input and output characteristics of a npn silicon transistor in the common emitter configuration. What kind of a circuit arrangement should she use for this purpose? What do you understand by cut-off, active and saturation states of the transistor? Draw the input and output characteristics curve for common emitter transistor why base is thin doped in transistors?

Or

Define potential barrier. Can it be measured by a voltmeter? Draw the V-I characteristics curve for reverse bias of a junction diode. Explain its working.
How a AND gate is realized from the NOR gate. Draw diode circuit of AND gate.
Find the output at Y if (i) A=0, B=0 (ii) A=1, B=1
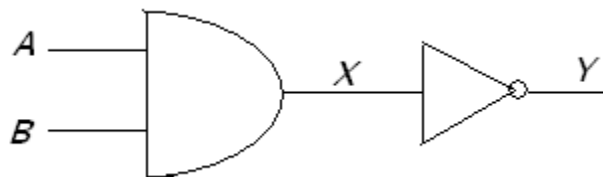
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