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PHYSICS

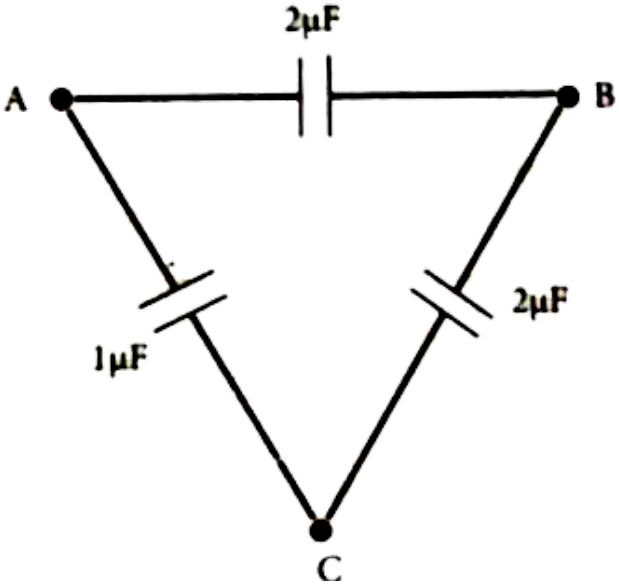
BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER 9

Part I

1. Three capacitors are connected in triangle as shown in the figure . The equivalent

capacitance between the points A and C is ..... .



A. 1uF

B. 2 uF

C. 3 uF

D. $\frac{1}{4}uF$

Answer: B

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2. If the electric field in a region is given by $\vec{E} = 5\hat{i} + 4\hat{j} + 9\widehat{K}$, then the electric flux through a surface of area 20 units lying in the y-z plane will be

A. 20 units

B. 80 units

C. 100 units

D. 180 units

Answer: C

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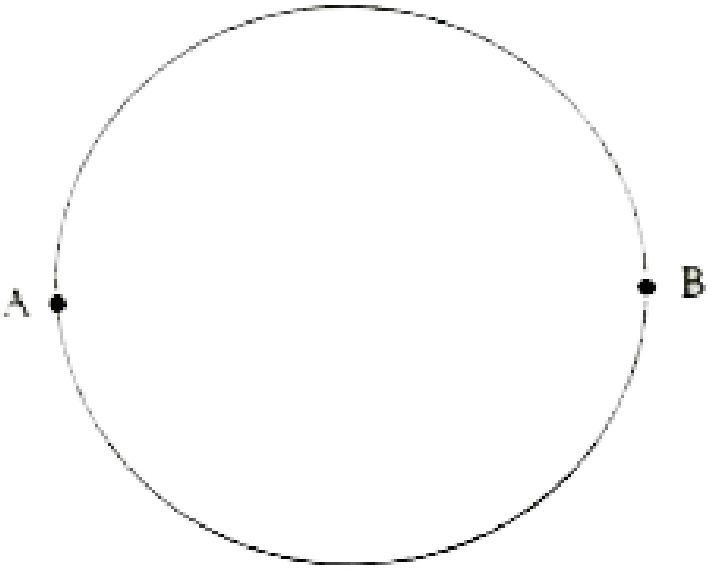
3. A wire of resistance 2 ohms per meter is bent to form a circle of radius 1 m. The equivalent resistance between its two diameterically opposite points, A and B as

shown in the figure is .....



A. $\pi\Omega$

B. $\frac{\pi}{2}\Omega$

C. $2\pi\Omega$

D. $\frac{\pi}{4}\Omega$

Answer: B

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4. A non-conducting charged ring of charge q. mass m and radius r is rotated with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is ..... .

A. M

B. $\frac{3}{\pi}M$

C. $\frac{2}{\pi}M$

D. $\frac{1}{2}M$

Answer: B

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5. A proton enters a magnetic field of flux density 1.5 Wb/m^2 with a spped of 2×10^7 m/s at angle of 30° with the field. The force on the proton will be

A. $0.24 \times 10^{-12} N$

B. $2.4 \times 10^{-12} N$

C. $24 \times 10^{-12} N$

D. $0.024 \times 10^{-12} N$

Answer: B

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6. In an electrical circuit, R, I, C and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current in the circuit,

is $\frac{\pi}{3}$. Instead, if C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is

A. 43862

B. $\frac{1}{\sqrt{2}}$

C. 1

D. $\frac{\sqrt{3}}{2}$

Answer: C

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7. The inductance of a coil is proportional to ...

A. its length

B. the number of turns

C. the resistance of the coil

D. square of the number of turns

Answer: D

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8. The electric and magnetic fields of an electromagnetic wave are

A. in phase and perpendicular to each other

B. out of phase and not perpendicular to each other

C. in phase and not perpendicular to each other

D. out of phase and perpendicular to each other

Answer: A

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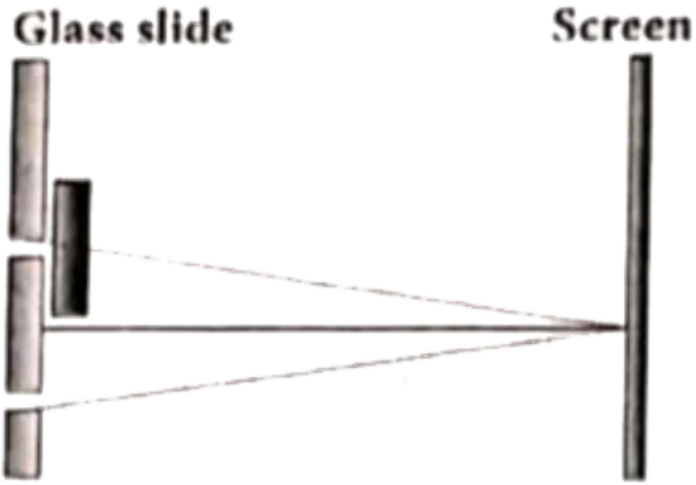
9. One of the of Young's double slits is covered with a glass plate as shown in figure. The

position of central maximum will,



A. get shifted downwards

B. get shifted upward

C. will remain the same

D. data insufficient to conclude

Answer: B

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10. The wavelength λ_e of an electron and λ_p of a photon of same energy E are related by.....

A. $\gamma_p \propto \gamma_e$

B. $\gamma_p \propto \sqrt{\gamma_e}$

C. $\gamma_p \propto \frac{1}{\sqrt{\gamma_e}}$

D. $\gamma_p \propto \gamma_e^2$

Answer: D

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11. A system consists of N_0 nucleus at t = 0. The number of nuclei remaining after half of a half-life (that is, at time $t = \frac{1}{2}T_{\frac{1}{2}}$)

A. $\frac{N_0}{2}$

B. $\frac{N_0}{\sqrt{2}}$

C. $\frac{N_0}{4}$

D. $\frac{N_0}{8}$

Answer: B

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12. In a pure semiconductor crystal, if current flows due to breakage of crystal bonds, then the semiconductor is called

A. acceptor

B. donor

C. intrinsic semiconductor

D. extrinsic semiconductor

Answer: C

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13. The light emitted in a LED is due to

A. Recombination of charge carriers

B. Reflection of light due to lens action

C. Amplification of light falling at the junction

D.

Answer: C

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14. The frequency range of 3 MHz to 30 MHz is used for

A. Ground wave propagation

B. Space wave propagation

C. Sky wave propagation

D. Satellite communication

Answer: C

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15. The materials used in Robotics are

A. Aluminium and silver

B. Silver and gold

C. Copper and gold

D. Steel and aluminium

Answer: D

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Part Ii

1. Define Electric dipole.

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2. Define current density.

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3. What is magnetic susceptibility ?

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4. What is meant by electromagnetic induction ?

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5. A coil of 200 turns carries a current of o.4 A. If the magnetic flux of 4 m Wb is linked with the coil, find the inductance of the coil.

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6. Why do stars twinkle?

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7. How many photons of frequency $10^{14} Hz$ will make up 19.86 J of energy ?

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8. Define curie.

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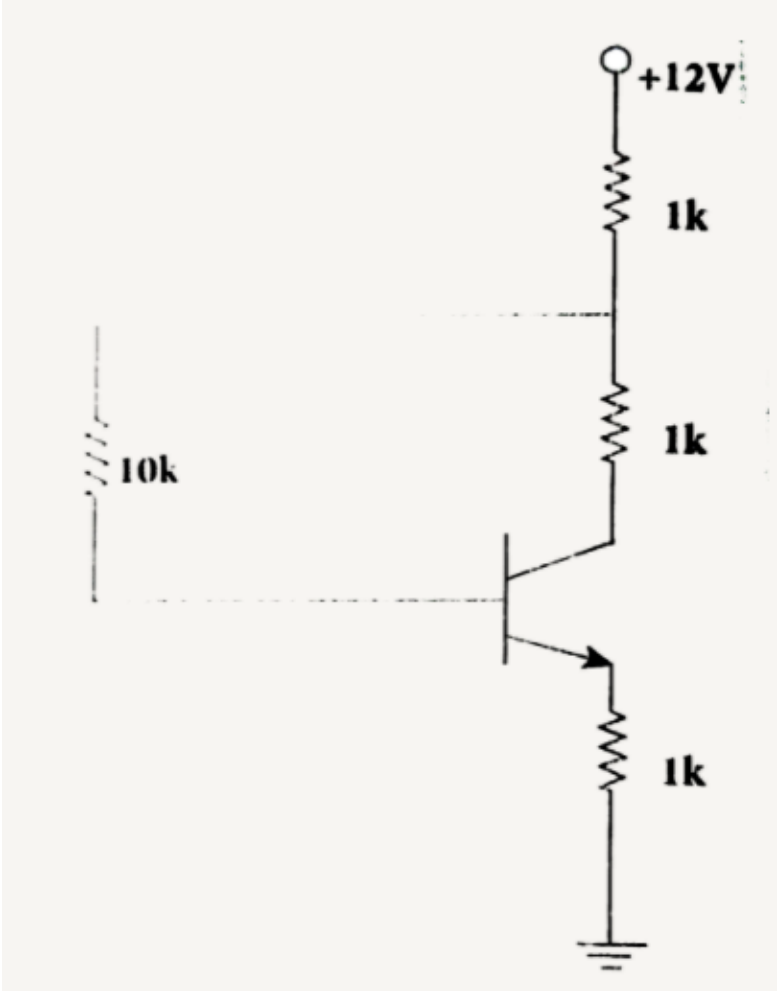
9. A transistor having α=0.99 and V_BE=0.7V, is given in the circuit. Find the value of the

collector current.



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10. Write a short note on electrostatic shielding .

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Part Iii

1. A conductor of linear mass dendity 0.2 g m^{-1} suspended by two flexible wire as shown in figure. Suppose the tension in the supporting wires is zero when it is kept inside

the magnetic field of 1 T whose direction is into the page.

Compute the current inside the current and also the direction for the current . Assume $g = 10 \ \ \mathrm{ms}^{-2}$

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2. How is Eddy current produced? How do they flow in a conductor ?

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3. Explain the concept of intensity of electromagnetic waves.

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4. If the focal length is 150 cm for a glass lens, what is the power of the lens?

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5. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength. Justify.

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6. Distinguish between avalanche and zener breakdown.

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7. Explain centre frequency or resting frequency in frequency modulation.

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8. What are black holes?

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Part Iv

1. How do we determine the electric field due to a continuous charge distribution ? Explain. Electric field due to continous charge distribution

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2. Obtain the macrscopic form of Ohm's law form its microscopic form and discuss its limitation.

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3. calculate the magnetic field inside and outside of the long solenoid using ampere's circuital law.

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4. Explain the construction and working of transformer.

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5. Discuss the source of electromagnetic waves

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6. Explain about compound mircoscope and obtain the equation for magnification. Compound microscope:

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7. Write about electron microscope.

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8. Discuss the process of nuclear fission and its properties.

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9. Transistor functions as a switch. Explain.

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10. What is modulation? Explain the types of modulation with necessary diagrams.

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