



PHYSICS

BOOKS - FULL MARKS PHYSICS (TAMIL ENGLISH)

SAMPLE PAPER 3 (SOLVED)

Part I

1. Two metallic spheres of radii 1 cm and 3 cm are given charges of $-1 \times 10^{-2}C$ and

5×10^{-2} C respectively . IF these are connected by a conducting wire the final charge on the bigger sphere is

A. 3×10^{-2} C

B. 4×10^{-2} C

C. 1×10^{-2} C

D. 2×10^{-2} C

Answer:



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2. What is the value of resistance of the following resistor?



- A. $100k\Omega$
- B. $10k\Omega$
- C. $1k\Omega$
- D. $1000k\Omega$

Answer:



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3. A flow of 10^7 electrons per second in a conduction wire constitutes a current of

A. 1.6×10^{-26} A

B. 1.6×10^{-2} A

C. 1.6×10^{-2} A

D. 1.6×10^{-26} A

Answer:



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4. The force experienced by a particle having mass m and charge q accelerated through a potential difference V when it is kept under perpendicular magnetic field \vec{B} is

A. $\sqrt{\frac{2q^3 BV}{m}}$

B. $\sqrt{\frac{q^3 B^2 V}{2m}}$

C. $\sqrt{\frac{2q^3 B^2 V}{m}}$

D. $\sqrt{\frac{2^3 BV}{m^3}}$

Answer:



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5. A magnetic needle is kept in a non-uniform magnetic field. It experiences

- A. a force and a torque
- B. a force but not a torque
- C. a torque but not a force
- D. neither a force nor a torque

Answer:



6. The instantaneous values of alternating current and voltage in a circuit are

$$I = \frac{1}{\sqrt{2}} \sin(100\pi t) \quad \text{A} \quad \text{and}$$

$$v = \frac{1}{\sqrt{2}} \sin\left(100\pi t + \frac{\pi}{3}\right) \quad \text{V.}$$

The average power in watts consumed in the circuit is

- A. $\frac{1}{4}$
- B. $\frac{\sqrt{3}}{4}$
- C. $\frac{1}{2}$
- D. $\frac{1}{8}$

Answer:



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7. Which of the following is an electromagnetic wave?

A. α - rays

B. β - rays

C. γ -rays

D. all of them

Answer:



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8. When light is incident on a soap film of thickness 5×10^{-5} cm, the wavelength of light reflected maximum in the visible region is 5320 Å. Refractive index of the film will be,

A. 1.22

B. 1.33

C. 1.51

D. 1.83

Answer:



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9. A plane glass is placed over a various coloured letters (violet, green, yellow, red) The letter which appears to be raised more is,

A. red

B. yellow

C. green

D. violet

Answer:



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10. In photoelectric emission, a radiation whose frequency is 4 times threshold frequency of a certain metal is incident on the metal. The an the maximum possible

velocity of the emitted electron will be.....

A. $\sqrt{\frac{hv_0}{m}}$

B. $\sqrt{\frac{6hu_0}{m}}$

C. $2\sqrt{\frac{hv_0}{m}}$

D. $\sqrt{\frac{hv_0}{2m}}$

Answer:



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11. The number of photo-electrons emitted for light of a frequency ν (higher than the threshold frequency ν_0) is proportional to

A. Threshold frequency (ν_0)

B. Intensity of light

C. Frequency of light (ν)

D. $\nu - \nu_0$

Answer:



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12. Atomic number of H-like atom with ionization potential 122.4 V for $n = 1$ is

A. 1

B. 2

C. 3

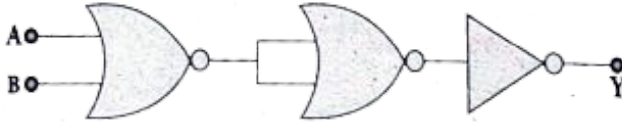
D. 4

Answer:



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13. The given electrical network is equivalent to



A. AND gate

B. OR gate

C. NOR gate

D. NOT gate

Answer:



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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:



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15. Which one of the following is the natural nanomaterial?

A. Peacock feather

B. Peacock beak

C. Grain of sand

D. Skin of the Whale

Answer:



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1. When two objects are rubbed with each other approximately a charge of 50 nC can be produced in each object. Calculate the number of electrons that must be transferred to produce this charge.



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2. State Kirchhoff's voltage rule.



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3. Define magnetic dipole moment.



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4. What is meant by 'Wattful current'?



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5. What are electromagnetic waves?



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6. Two light sources have intensity of light as I_0 , What is the intensity at a point where the two light waves have a phase difference of $\pi / 3$?



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7. State de Broglie hypothesis.



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8. Calculate the energy equivalent of 1 atomic mass unit.



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9. What do you mean by doping ?



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Part Iii

1. What are the differences between Coulomb force and gravitational force ?



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2. The resistance of a nichrome wire at $0^{\circ}C$ is 10Ω . If its temperature coefficient of resistance is $0.004/^{\circ}C$ find its resistance at boiling point of water. Comment on the result.



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3. What is meant by magnetic induction ?



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4. A capacitor blocks D.C, but allows A.C to pass through it. Explain why.



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5. Derive the relation between f and R for a spherical mirror.





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6. What is a photo cell ? Mention the different types of photocells.



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7. Show that nuclear density is almost constant for nuclei with $Z > 10$.



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8. Calculate the range of the variable capacitor that is to be used in a tuned-collector oscillator which has a fixed inductance of $150 \mu\text{H}$. The frequency band is from 500 KHz to 1500KHz.



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9. Distinguish between wireline and wireless communication? Specify the range of electromagnetic waves in which it is used.



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Part Iv

1. Explain in detail the construction and working of a Van de Graaff generator.



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2. Explain the equivalent resistance of a series and parallel resistor network.



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3. Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current.



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4. Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$)



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5. Derive the equation for refraction at single spherical surface.



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6. What do you mean by electron emission ?
Explain briefly various methods of electron emission.



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7. Discuss the spectral series of hydrogen atom.



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8. State and prove De Morgan's First and second theorems.



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



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10. Elaborate any two types of Robots with relevant examples.



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