PHYSICS

BOOKS - UNITED BOOK HOUSE

QUESTION PAPER 2018

Example

1. A charge Q is situated inside a cube placed in air. The electric flux passing through all the six faces is-

A. $\frac{Q}{e}plison_0$

B. $\frac{Q}{2}eplison_0$

C. $\frac{Q}{6}eplison_0$

D. $\frac{Q}{8}eplison_0$

Answer:

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2. 64 identical spheres of charge q and capacitance C each are combined to form a

large sphere. The charge and capacitance of the large sphere is

A. 64 q,C

B. 16 q,4C

C. 64q, 4C

D. 16 q,C

Answer:

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3. By how much will the power of an electic bulb decrease if the current drops by 0.5%?

A. 0.0025

B. 0.005

C. 0.01

D. 0.02

Answer:

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4. Two similar bar magnetic moment M each are attached at right angle with each other at their ends. The magnetic moment of the system will be

A. M

B. 2M

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

D. $\sqrt{2}M$

Answer:

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5. An electron having charge e moves with velocity $\overrightarrow{v}$ in +x direction. An electric field acts on it along +y direction. The force on the electron acts along-

A. $+zdirection$

B. $-zdirection$

C. `+ y direction

D. $-ydirection$

Answer:

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6. the number of turns of the primary and secondary of a transformer are 500 and 5000 respectively. The primary is connected to a 20V, 50Hz A.C. Supply. The output of the secondary will be

A. 2V,50Hz

B. 200V, 50Hz

C. 200V, 5Hz

D. 200V, 500Hz

Answer:

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7. IF the rotating speed of a dynamo is doubled, the induced electromotive force will be

A. double

B. halved

C. four times as much

D. unchanged

Answer:

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8. The electric and magnetic field of electromagnetic waves are-

in opposite phase and perpendicular to each other

in oppopsite phase and parallel to each other

in the same phase and perpendicular

in the same phase and parallel to each other.

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9. Rays from the sun subtend an angle θ (in radian) at the pole of a concave mirror of focal length f. If the diameter of the sun is D the diameter of the image of the sun formed by the mirror is-

A. $D\theta$

B. $2D\theta$

C. $f\theta$

D. $2f\theta$

Answer:

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10. Which one does not change in polarisation of light?

A. Intensity

B. Phase

C. Frequency

D. None of these.

Answer:

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11. The wave length of de-Brogile waves associated with a thermal neutron of mass m at absolute temperature T is given by (k is the Boltzmann constant-

A. $\frac{h}{\sqrt{m}}kT$

B. $\frac{h}{\sqrt{2}}mkT$

C. $\frac{h}{\sqrt{3}}mkT$

D. $\frac{h}{\sqrt{2}}mkT$

Answer:

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12. If V be the accelerating voltage, then the maximum frequency of X-ray emitted from an X-ray tube is

A. $e\frac{h}{V}$

B. $e\frac{V}{h}$

C. $\frac{h}{e}V$

D. none of these.

Answer:

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13. In normal transistor operation-

A. emitter base junction and collector-base junction are both in rervese bias

B. emitter base junction is in forward bias and collector base junction is in reverse bias

C. emitter base junction and collector base junction both are in forward bias.

D. emitter base junction is in reverse bias and collector base junction is in forward bias.

Answer:

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14. For television broadcasting the frequency employed is-

A. 300MHz

B. 30-300MHz

C. 30-300KHz

D. 30-300Hz

Answer:

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15. Why is diamagnetism indepedent of temperature?

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16. Of ammeter and voltmeter whose resistance is greater & why?

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17. A coil of metal wire is stationary in a non-uniform magnetic field. Is an e.m.f. Induced in the coil? Give reason.

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18. What is the rms value of the current $i = 5\sqrt{2}\sin 100\pi t$ A?

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19. Why does a photo-diode function in reverse bias?

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20. An wire of resistance R is elongated n-fold to make a new uniform wire. The resistance of new wire

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21. Show diagrammatically the behavior of magnetic field lines in presence of

i) Paramagnetic and

ii) Diamagnetic material

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23. A place electromagnetic wave $E_z = 100\cos\left(4 \times 10^{-7} z - 50t\right)$ V/m propagates in a medium. Find the refractive index of the medium.

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24. What is displacement current? Why is it necessary?

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25. Draw the curve showing the variation of binding energy per nucleon as a function of mass number A. Explain the stability of the nucleus from the curve.

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26. The radius of nucleus: $R = R_0 A^{\frac{1}{3}}$ (R_0 =constant, A=mass No.). Taking the relation,

show that the nuclear density does not depend on mass number A.

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27. What is an antenna? Find the length of a dipole antenna for a carrier wave of frequency 3×10^8Hz

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28. Show that electric field intenstity on the surface of a charged conductor is $\vec{E} = \frac{\sigma}{\varepsilon_0}\vec{n}$ where σ is the surface density of charge and $\vec{n}$ is the outward pointing unit normal vector.

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29. Why are electric lines of force not closed loop?

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30. The electric potential at a point (x,y,z) is given by $V = -x^2y - xz^3 + 4$. Find the intensity of electic field $\overrightarrow{E}$ at that point.

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31. Show that electric field intensity is normal to equipotential surface.

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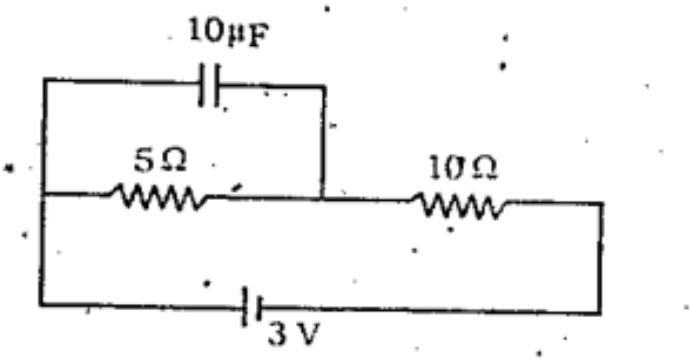
32. What will be the charge on the capacitor in the circuit given below?



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33. Find the energy stored in the capacitor.

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34. Find out the expression for the magnetic field at a point on the axis of a toroid of N turns having average redius r and carrying a corrent I . Show that the magnetic field in the open space inside and outside the toroid is zero.

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35. Two long parallel straight wires P& Q separated by a distance 5 cm in air carry

currents of 4A and 2A respectively in same direction. Find the magnitude of the force acting per cm of the wire P and indicted the direction of the force.

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36. Explain total internal reflection from law of refraction.

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37. A ray of lilght is incident at a small angle θ on a rectangular glass slab of thickness t. IF the refractive index of glass is μ show that the perpendicular distance between the emergent ray from the slab and the incident ray is $\theta t(\mu - 1)/\mu$

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38. Two lenses, one convex and the other concave are kept in contact. The focal length

of convex lens is 30cm and that of concave lens is 20 cm. Whaat will be the equibalent focal length of the combination? What will be the nature of the combination?

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39. Explain the cause of dispersion of light.

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40. What is understood by diffraction of light? In a single slit experiment, if the width of the slit increases, what will be the change of angular width of the central maxima? State Brewster's law.

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41. An unpolarised light is incident at angle of polarisation on a reflector. Determine the

angle between the reflected and the transmitted rays.

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42. Why are polaroids used in sunglasses?

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43. A Person who can see objects clearly at a distance of 10cm, required spectacles to be able ot see clearly objects at a distance of

30cm. What types of spectacle should he use? Find the focal length of the lens.

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44. Draw the curve showing the variation of de-Brogli wavelength of a particle with its momentum. Find the momentum of a photon of wavelength 1000 nm.

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45. Mention the inference of Davission-Grammer experiment.

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46. Define stopping potential.

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47. When a certain metal surface is illuminated with light of frequency v, the stopping

potential for photoelectric current is V_0. When the same surface is illuminated by light of frequency $\frac{v}{2}$ the stopping potent $\frac{V_0}{4}$. The threshold frequency for photoelectric emission is

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48. Using Bohr's porstulates of atomic model, derive the expression for the radius of the n^{th} orbit.

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49. What is ionisation energy of atom? What is the value of it for hydrogen atom?

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50. What is meant by activity of a radioactive sunstance? Write its SI unit.

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51. Half-life of a radioactive substance is 30 days. Number of atoms in the substance is 10^{12}. How many disintegration of atoms per second does occur?

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52. Form AND gate using NOR gates.

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53. Wahat is a p-n junction diode? Draw the circuit diagram of a full wave rectifier using p-n junction diodes. Show the imput and output voltage waveforms by a schematic graph.

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54. Draw the output characteristic curves of a n-p-n transistor in a C-E configuration and find the output resistance from it.

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55. What is Zener dioide? Draw its voltage vs currrent characteristics in the reverse bias and indicaste the breakdown voltage on the characteristics. Mention one important use of this diode.

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56. Explain, with circuit diagram, how a Zener diode regulates voltage across a load resistance.

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57. Two cells of emf E_1, E_2 and internal resistances r_1, r_2 respectively are connected in parallel combination. Determine the equivalent emf of the combination.

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58. Estimate the average drilft velocity of conduction electrons in a copper wire of cross-

section $20 \times 10^{-3}\ cm^2$ carrying a current of 20A. Assume the density of conduction electrons to be $9X10^{28}m^3$.

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59. Under what condition will be terminal petential difference be more than the e.m.f. of a cell?

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60. Heat is produced at a rate given by H in a resistor when it is connected across a supply of voltage V. If now the resistance of the resistor is doubled and the supply voltage is made V/3 then the rate of production of heat in the resistor will be

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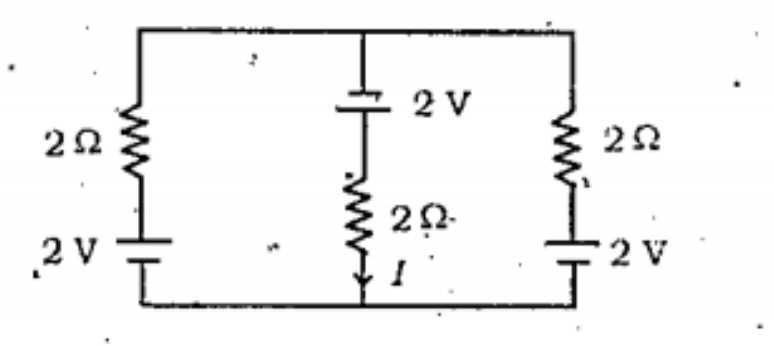
61. Determine the value of I in the circuit.



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62. Establish the balanced condition of Wheatstone's bridge by applying Krichhoff's laws.

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63. A horozontal straight wire 5m long extending from east to west is falling with a speed of 10 ms^{-1} at right angles to the horizontal component of earth's magnetic field 0.40×10^{-4} Wb m^{-2}.

Find the instantaneous value of emf induced in the wire

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64. A horozontal straight wire 5m long extending from east to west is falling with a speed of 10 ms_{-1} at right angles to the horizontal component of earth's magnetic field $0.40 \times 10_4$ Wb m_2.

What is the direction of the emf?

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65. A horozontal straight wire 5m long extending from east to west is falling with a

speed of 10 ms_{-1} at right angles to the horizontal component of earth's magnetic field $0.40 \times 10_4$ Wb m_2.

Which end of the wire will be at higher potential?

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66. Derive the expression for energy stored in an inductor of coefficient of self inductance L carrying current i_0.

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67. State the working principle of A.C. generator.

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68. Why is the use of ac voltage preferred over dc voltage? Given two reasons.

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69. The power factor of a LR circuit is $\frac{1}{\sqrt{3}}$. IF the frequency of ac be doubled, what will be the power factor?

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70. What is the importance of coherent sources in the phenomenon of interference?

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71. In young's double slit experiment, the fringe width is 2.0 mm.. Determine the separation, between the 9th bright fringe and the 2nd dark fringe.

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72. A plano-concave lens is made of glass of refractive index 1.5 an the radius of curvature of its curved surface is 50 cm. What is the power of the lens?

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73. Find the anguylar width of the cental maxima of Fraundhofer diffraction parttern due to single slit.

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74. How does the angular width of the central maxima in a single slit Fraunhofer dirrfraction experiment change when th distance between the slit and screen is doubled?

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75. In Fraundhofer diffraction experiment the first minima of red light$(\lambda = 660mm)$ is formed on the first maxima of another light of wavelength λ. Find the value of λ.

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