PHYSICS

BOOKS - KCET PREVIOUS YEAR PAPERS

MODEL TEST PAPER 02

Physics

1. The position of a particle at time t , is given by the relation :

$$x(t) = \left(\frac{v_0}{\alpha}\right)\left(1 - e^{-\alpha t}\right) \quad \text{where} \quad v_v \quad \text{is} \quad \text{a}$$

constant $\alpha > 0$. The dimensions of v_0 and α are respectively .

A. $M^0 L^1 T^0$ and T^{-1}

B. $M^0 L^1 T^{-1}$ and T^{-1}

C. $M^0 L^1 T^{-1}$ and T

D. $M^0 L^1 T^{-1}$ and T^{-2}

Answer: B

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2. Spot the wrong statement : The acceleration of due to gravity , g , decreased if

A. We go down from the surface of the earth towards its centre

B. We go from the equator towards the poles on the surface of the earth

C. We go up from the surface of the earth

D. The rotational velocity of the earth is increased

Answer: B

3. The critical angle of a medium-air interface is $30°$. The refractive index of the medium is

A. $1/2$

B. $3/2$

C. $2/3$

D. 2

Answer: D

4. Ray optics is valid , when characteristic dimensions are

    A. Of the same order as the wavelength of light

    B. Of the order of one millimetre

C. Much smaller than the wavelength of

light

D. Much larger than the wavelength of

light

Answer: D

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5. In an ideal gas the meaning of isothermal

exapansion is

A. Its heat remains constant

B. Its temperature and pressure remain

constant

C. Its temperature and heat both remain

constant

D. Its temperature remains constant

Answer: D

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6. If a given mass of gas occupies a volume of 100 cc at 1 atmosphere and at a temperature of $100°C$. What will be its volume at 4 atmospheres pressure , the temperature being constant

   A. 100 cc

   B. 400 cc

   C. 105 cc

   D. 25 cc

Answer: D

7. Two strings are attached to two nails in the same horizontal level and knoted at a point . A mass of 2 kg is suspended from the knot . If the strings make angles of $30°$ and $60°$ respectively with the vertical the tensions in the strings are

    A. $\sqrt{3}$ kg wt , 1 kg wt .

    B. $1/2$ kg wt . , $\sqrt{3}/2$ kg wt.

    C. $\sqrt{3}$ kg wt ....,1 kg wt

D. $\sqrt{3}/2$ kg wt , 1/2 kg wt.

Answer: A

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8. A body of mass 13 kg is suspended by two strings of length 5 cm and 12 cm . The other ends of the strings are tied to two pegs 13 cm apart along a horizontal line . The tensions in the strings are

A. 5 kg wt , 12 kg wt .

B. 12 kg wt . , 5 kg wt .

C. 5/13 kg wt. , 12/13 kg wt .

D. 12/13 kg wt ., 5/13 kg wt.

Answer: A

9. If the gravitional force between two objects were proportional to 1/R (and not as $1R^2$) where R is separation between them , then a

particle in circular orbit under such a force would have its orbital speed v proportional to

A. $1/R^2$

B. R

C. R° (independent of R)

D. 1/R

Answer: C

10. If $x = 4t^2 - 5t$ and $y = 6t$, then acceleration of a body is given by

A. 30 metre/sec

B. 8 metre/ $\sec^2$

C. 16 metre / $\sec^2$

D. none of these

Answer: B

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11. A circular coil carrying a certain current produces a magnetic field B_0 at its centre.The coil is now rewound so as to have 3 turns and the same current is psses through it.The new magnetic field at the centre is

A. Is the same

B. Increases to 4 times the value

C. Decreases to 1/4 of the value

D. Increases to 16 times the value

Answer: D

12. The binding energy per nucleon curve is sharp for helium . This shows that helium is
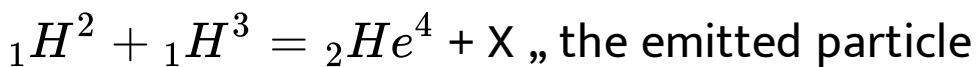
A. Radioactive

B. Stable

C. Fissionable

D. Unstable

Answer: B

13. In the nuclear reaction ,

$_1H^2 + _1H^3 = _2He^4 + X$,, the emitted particle X is

    A. Proton

    B. Positron

    C. Electron

    D. Neutron

Answer: D

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14. The mass of a neutron

    A. Is exactly equal to that of a proton

    B. Is slightly greater than that of a proton

    C. Is exactly equal to that of an electron

    D. Varies slightly depending on the nucleus

      , in which is it present

Answer: B

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15. Salol can be used as:

A. Pure semiconductor

B. N-type semiconductor

C. P-type semiconductor

D. P-N junction

Answer: D

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16. The function of a moderator in a nuclear reactor is

A. To slow down the neutrons

B. To absorb neutrons

C. To speed up the neutrons

D. To stop the nuclear chain reaction

Answer: A

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17. A candle flame gives

    A. Line spectrum

    B. Continuous emission spectrum

    C. Band spectrum

    D. Continuous absorption spectrum

Answer: B

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18. A long wire carrying a steady current I lies in the plant of a circular conducting loop placed at a certain distance from the wire . There will be an induced current in the loop if it is

A. Moved parallel to the wire

B. Rotated about an axis parallel to the wire passing through the centre of the loop

C. Rotated about an axis perpendicular to
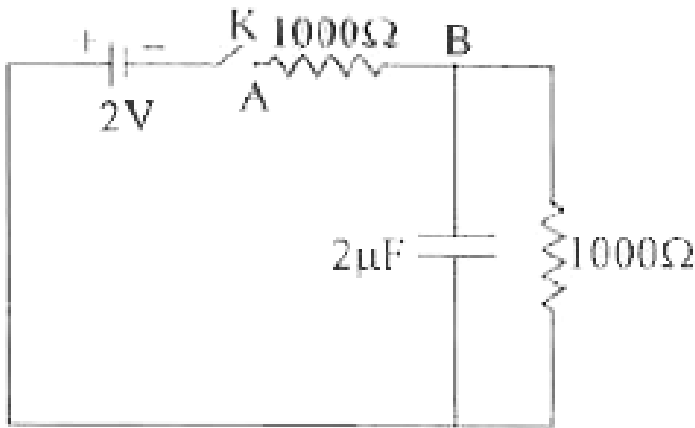
the plane of the loop.

D. Moved away from the wire .

Answer: B

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19. When the key K is pressed at time t = 0 ,

which one of the following statemens about

the current I in resistor AB of the given circuits

is true ?

A. At t = 0 , I = 2 m A , and with time it goes

to 1 mA

B. I oscillates between 1 mA and 2 mA

C. I = 2 mA at all t

D. I= 1 m A at all t

Answer: A

20. Critical size is the minimum size of fissionable material for which fission reaction

A. Is not suitable

B. Has increasing rate with time

C. Is just sustained

D. Has decreasing rate with time

Answer: C

21. The R.M.S. value of the voltage in an A.C. circuit is 220 V. Its peak value is

A. $220\sqrt{2}$

B. $2\sqrt{220}$

C. $220/\sqrt{2}$

D. $\sqrt{2}/220$

Answer: A

22. A current of 2 ampere passes through a wire for 8 seconds . Number of electrons passing across the wire is (electronic charge 1.6×10^{-19} coulomb)

A. 3.2×10^{20}

B. 1×10^{20}

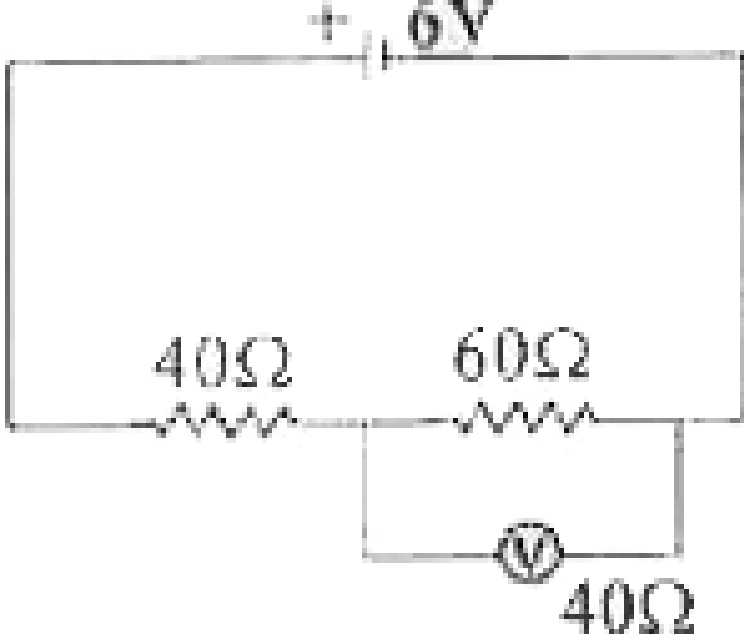C. 3.2×10^{18}

D. 1×10^{18}

Answer: B

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23. The measurement of voltmeter in the following circuit is

A. 2.3 volt

B. 6.0 volt

C. 4.0 volt

D. 2.5 volt

Answer: A

24. Light of wavelength 6328 Å incident normally on a slit having a width of 0.2 mm The width of the central maximum, measured from minimum to minimum of the diffraction pattern on a screen 9.0 metres away will be about

A. $0.36°$

B. $0.72°$

C. $0.18°$

D. $0.09°$

Answer: A

25. White light is used to illuminate the two slits in Young's double slit experiment. The separation between the slits is b and the screen is at a distance d> > b) from the slits. At a point on the screen directly infront of one of

the slits, certain wavelengths are missing. Some of these missing wavelengths are

A. $\lambda = b^2 / d$

B. $\lambda = b^2 / 5d$

C. $\lambda = 2b^2 / d$

D. $\lambda = 2b^2 / 3d$

Answer: A

26. A diffraction pattern is obtained using a beam of red light. What happens if the red light is replaced by blue light?

    A. No change

    B. Bands become broader and farther apart

    C. Diffraction bands become narrower and crowded together

    D. Bands disappear

Answer: C

27. Sound waves cannot be polarised because their

A. Velocity is very small

B. Longitudinal nature

C. Frequency is very small

D. Requirement of material to propagate

Answer: B

28. In a Copper-Iron thermocouple the thermoelectric current flows from

A. Copper to iron at cold junction

B. Iron to copper at hot junction

C. Iron to copper at cold junction

D. none of these

Answer: C

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29. A ferromagnetic substance when heated beyond the Curie temperature

    A. Becomes diamagnetic

    B. Becomes non-magnetic

    C. Remains ferromagnetic

    D. Becomes paramagnetic

Answer: D

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30. Three resistance , each of 1 ohm are joined in parallel . Three such combinations are put in series , then the resultant resistance will be

A. 9 ohm

B. 1 ohm

C. 3 ohm

D. 1/3 ohm

Answer: B

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31. In L.C.R. circuit , phase difference between voltage and current can be

A. $180°$

B. $145°$

C. $-90°$ to $90°$

D. $0°$

Answer: A

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32. Four resistors R_1, R_2, R_3 and R_4 are connected in parallel . The resultant resistance R is

A. Equal to the sum of the four resistance

B. Less than the sum of the four resistance

C. Greater than the sum of the resistances

D. Less than any of the four resistance

Answer: D

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33. In a balanced Wheatstone's network the galvanometer is replaced by another of lower resistance , then the network is

   A. Balanced

   B. May or may not be balanced

   C. Not balanced

   D. none of these

Answer: A

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34. The insertion of a new metal into a thermocouple

    A. Increases the thermo- emf

    B. Does not after the thermo-emf

    C. Decreases the thermo-emf

    D. Reverses the direction of the thermo-emf .

Answer: B

35. The electrical resistance in ohms of a certain thermometer varies with temperature according to the approximate law:

$$R = R_0[1 + \alpha(T - T_0)]$$

The resistance is 101.6Ω at the triple-point of water $273.16K$, and 165.5Ω at the normal melting point of lead $(600.5K)$. What is the temperature when the resistance is 123.4Ω?

    A. $R = ae^{b/T}$

    B. $R = ae^{b/T_2}$

C. $R = ae^{b/T}$

D. $R = ae^{h/\sqrt{T}}$

Answer: C

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36. A.T.G. gives a deflection of $30°$ for a certain current at one place and a deflection of $45°$ at another place . The values of the horizontal component of the earth's fields at the two places and in the ratio of

A. $1 : \sqrt{3}$

B. $3 : \sqrt{2}$

C. $2 : \sqrt{3}$

D. $\sqrt{3} : 1$

Answer: D

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37. In Melde's experiment the number of loop on the string changes from 4 to 3 by an

addition of 0.014 gm .wt. what is the initial weight attached to the string ?

A. 0.0018 gm wt.

B. 0.18 gm wt.

C. 0.018 gm wt.

D. 1. 8 gm wt.

Answer: B

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38. The tension in a sonometer wire is increased by a factor of four . The fundamental frequency of vibration changes by a factor of

A. 4

B. 2

C. $\dfrac{1}{2}$

D. $\dfrac{1}{4}$

Answer: B

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39. There is no transmission of energy in

    A. Electromagnetic waves

    B. Longitudinal progressive waves

    C. Transverse progressive waves

    D. Stationary waves

Answer: D

40. A tuning fork of frequency 100 when sounded together with another tuning fork of unknown frequency produces 2 beats per sec . On loading the second tuning fork , sounded together with first tuning fork , produces one beat , then the frequency of the second tuning fork is

A. 102

B. 99

C. 98

D. 101

Answer: A

41. In the propagation of electromagnetic waves the angle between the direction of propagation and plane of polarisation is

A. $0°$

B. $90°$

C. $45°$

D. $180°$

Answer: B

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42. A calcite crystal is placed over a dot on a piece of paper and rotated . On seeing through the calcite , one will be

A. One dot

B. Two rotating dots

C. Two stationary dots

D. One dot rotating about the other

Answer: D

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43. When viewed in white sight soap bubble show colour because of

A. Interference

B. Diffraction

C. Scattering

D. Dispersion

Answer: A

44. Which one of the following statements is corrects ?

A. In vacuum , the speed of light depends

upon wavelength

B. In vacuum , the speed of light does not

depend upon frequency

C. In vacuum , the speed of light depends

upon frequency .

D. In vacuum , the speed of light is

independent of frequency and

wavelength

Answer: D

45. Two charges q_1, q_2 are placed in vacuum at a distance d , and the force acting between them is F . If a medium of dielectric constant 4 is introduced around them , the force now will be

A. 4 F

B. F/2

C. 2 F

D. F/4

Answer: D

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46. A capacitor has a charge of 6×10^{-4} C . When the potential difference across the plates is 150 volts , its capacitance is
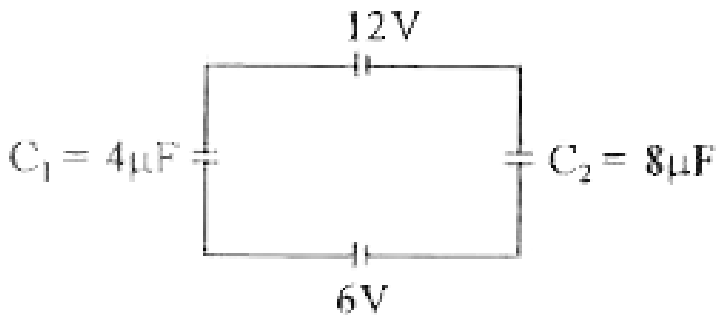
A. $250\mu F$

B. $9\mu F$

C. $0.25\mu F$

D. $4\mu F$

Answer: D

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47. In the circuit shown

A. The charge on C_2 is greater than that of

C_1

B. The potential drops across C_1 and C_2

are the same .

C. The charges on C_1 and C_2 are the same

D. The potential drop across C_1 is greater

than that across C_2 .

Answer: A

48. An electron makes a transition from orbit n = 4 to the orbit n = 2 of a hydrogen atom . The wave number of the emitted radiations (R = Rydberg's constant) will be
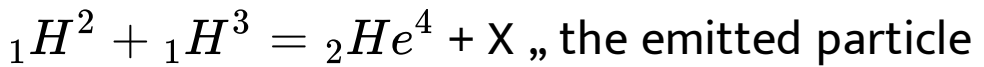
A. 4R/16

B. 2R/16

C. 5R/16

D. 3R/16

Answer: D

49. In the nuclear reaction ,

$_1H^2 + {}_1H^3 = {}_2He^4 + X$ „ the emitted particle X is

A. Nitrogen of mass 16

B. Oxygen of mass 16

C. Nitrogen of mass 17

D. Oxygen of mass 17

Answer: D

50. The difference between U^{218} and U^{215} atoms is that

A. U^{238} contains 3 more protons

B. U^{238} contains 3 more neutrons and 3 more electrons

C. U^{238} contains 3 more protons and 3 more electrons

D. U^{238} contains 3 more neutrons

Answer: D

51. Atomic mass number of an element is 232 and its atomic number is 90 . The end of radioactive disintegration we obtain an isotope of lead with A = 208 and Z = 82 . Then the number of emitted alpha and beta particles are

A. $\alpha = 5, \beta = 4$

B. $\alpha = 5, \beta = 5$

C. $\alpha = 6, \beta = 4$

D. $\alpha = 4, \beta = 6$

Answer: C

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52. Of the following which one can penetrate

through 20 cm thick steel plate ?

A. α - particles

B. γ- rays

C. β - particles

D. ultra violet rays

Answer: B

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53. Rutherfords experiments on scattering of α-particles proved that :

A. The atoms as a whole is positively charged

B. There is no charged particle inside the atom

C. The atom consists of uniformly distributed positive and negative charged particles

D. The atom has a very small , positively charged core at the centre

Answer: D

54. Select the correct statement (s) from the following

A. A fusion reactor requires a very high temperature , of the order of 10^7 K , while a fission reactor does not require such high temperatures .

B. Nuclear fusion involves a heavy nuclei , while nuclear fission occurs in light

elements .

C. Two hydrogen atoms combine to form a hydrogen molecule is an example of nuclear fusion .

D. None of the above

Answer: A

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55. Draw a labeled diagram of cross section of a leaf.

A. Only single strand for d.c., either for a.c.

B. Either for d.c., only multiple strands for

   a.c.

C. Only single strand for a.c., either for d.c.

D. Only single strand for d.c., only multiple

   strands for a.c.

Answer: C

56. A current which varies periodically with time and reverse its direction every half a cycle is called ... current.

A. Transient

B. Steady

C. Eddy

D. Alternating

Answer: D

57. Rsistance of a conductor depends on its

A. Length

B. Density

C. Volume

D. Mass

Answer: A

58. The basic insutument employed to detect current is

A. Galvanometer

B. Wattmeter

C. Ammeter

D. Voltmeter

Answer: C

59. A moving coil galvanometer has a resistance of 9.8Ω and gives a full scale deflection when a current of 10 mA passes through it. The value of the shunt required to convert it into a milli-Ammeter to measure current up to 500 mA is

    A. 0.02Ω

    B. 2Ω

    C. 0.2Ω

    D. 0.4Ω

Answer: C

60. Which of the following quantities can be written in SI units in kg $m^2 A^{-2} S^{-3}$?

A. Resistance

B. Capacitance

C. Inductance

D. Magnetic flux

Answer: A

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