GUJCET-E-2015

Test Booklet No. 06497 Test Booklet Code A

This booklet contains 48 pages.

DO NOT open this Test Booklet until you are asked to do so.

Important Instructions :

1) This test consists 120 questions of Physics, Chemistry and Biology. Each question carries **1** mark. For each correct response the candidate will get **1** mark. For each incorrect response ¼ mark will be deducted. Maximum marks is **120**.
2) This Test is of **3 hours** duration.
3) Use **Black Ball Point Pen only** for writing particulars on OMR Answer Sheet and marking answers by darkening the circle '•'.
4) Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5) **On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room / Hall. The candidates are allowed to take away this Test Booklet with them.**
6) The CODE for this Booklet is **A**. Make sure that the CODE printed on the Answer Sheet is the same as that on this booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
7) The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
8) Do not write your Seat No. anywhere else, except in the specified space in the Test Booklet / Answer Sheet.
9) Use of White fluid for correction is not permissible on the Answer Sheet.
10) Each candidate must show on demand his / her Admission Card to the Invigilator.
11) No candidate, without special permission of the Superintendent or Invigilator, should leave his / her seat.
12) Use of Manual Calculator is permissible.
13) The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and must sign the Attendance Sheet (Patrak - 01). Cases where a candidate has **not** signed the Attendance Sheet (Patrak - 01) be deemed not to have handed over the Answer Sheet and dealt with as an unfair means case.
14) The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
15) No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
16) The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet. (Patrak - 01)

SEAL

PHYSICS

1) In a N–P–N transistor about 10^{10} electrons enter the emitter in 2μs, when it is connected to a battery. Then I_E = _____ μA.

(A) 200

(B) 400

(C) 800

(D) 1600

2) The effective length of a magnet is 31.4 cm and its pole strength is 0.8 Am. The magnetic moment, if it is bent in the form of a semicircle is _____ Am^2.

(A) 1.6

(B) 1.2

(C) 0.16

(D) 0.12

3) Equal currents are passing through two very long and straight parallel wires in the same direction. They will _____.

(A) repel each other

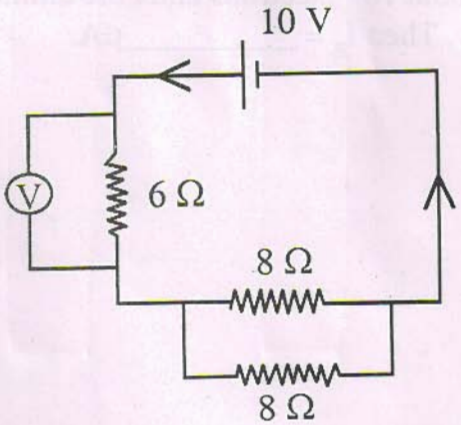
(B) attract each other

(C) lean towards each other

(D) neither attract nor repel each other

(Space for Rough Work)

4) A voltmeter of a very high resistance is joined in the circuit as shown in figure. The voltage shown by this voltmeter will be _____.



(A) 6 V (B) 5 V

(C) 2.5 V (D) 3 V

5) A galvanometer of resistance 50 Ω is connected to a battery of 8 V along with a resistance of 3950 Ω in series. A full scale deflection of 30 div is obtained in the galvanometer. In order to reduce this deflection to 15 division, the resistance in series should be _____ Ω

(A) 7900 (B) 1950

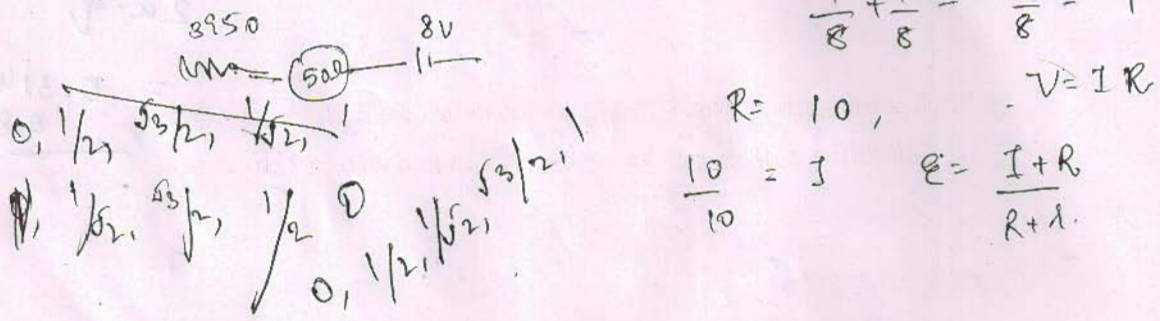
(C) 2000 (D) 7950

6) At a place on Earth, the vertical component of Earth's magnetic field is $\sqrt{3}$ times its horizontal component. The angle of dip at this place is _____.

(A) 30° (B) 60°

(C) 45° (D) 0°

(Space for Rough Work)



7) Which gate can be obtained by shorting both the input terminals of a NOR gate.

(A) OR (B) NOT

(C) AND (D) NAND

8) An optical fiber can offer a band width of _____.

(A) 100 MHz (B) 100 GHz

(C) 750 MHz (D) 250 MHz

9) To transmit a signal of 3 KHz frequency, the minimum length of antenna is _____km

(A) 20 (B) 25

(C) 50 (D) 75

10) 27 identical drops of mercury are charged simultaneously with the same potential of 10 Volt. Assuming the drop to be spherical, if all the charged drops are made to combine to form one large drop, then its potential will be _____ Volt.

(A) 90 (B) 40

(C) 160 (D) 10

11) When 10^{19} electrons are removed from a neutral metal plate through some process, the charge on it becomes _____.

(A) –1.6 C (B) +1.6 C

(C) 10^{19} C (D) 10^{-19} C

(Space for Rough Work)

12) One moving electron when comes closer to other stationary electron, then its kinetic energy and potential energy respectively _____ and _____.

(A) increases, decreases
(B) increases, increases
(C) decreases, increases
(D) decreases, decreases

13) An inclined plane of length 5.60 m making an angle of 45° with the horizontal is placed in an uniform electric field E = 100 Vm^{-1}. A particle of mass 1 kg and charge 10^{-2} C is allowed to slide down from rest position from maximum height of slope. If the co-efficient of friction is 0.1, the time taken by the particle to reach the bottom is _____.

(A) 1 s
(B) 1.41 s
(C) 2 s
(D) None of these

14) Charges 1 μc are placed at each of the four corners of a square of side $2\sqrt{2}$ m. The potential at the point of intersection of the diagonals is _____ (K = 9×10^9 SI unit)

(A) 18×10^3 V
(B) 1800 V
(C) $18\sqrt{2} \times 10^3$ V
(D) None of these (E) (zero)

15) A point charge q is situated at a distance r on axis from one end of a thin conducting rod of length L having a charge Q[Uniformly distributed along its length]. The magnitude of electric force between the two is _____.

(A) $\frac{2KQ}{r(r+L)}$
(B) $\frac{KQq}{r^2}$
(C) $\frac{KQq}{r(r-L)}$
(D) $\frac{KQq}{r(r+L)}$

(Space for Rough Work)

16) If alpha particle and deutron move with velocity v and $2v$ respectively, the ratio of their de - Broglie wave length will be _____.

(A) $1:\sqrt{2}$ (B) $2:1$

(C) $1:1$ (D) $\sqrt{2}:1$

17) de - Broglie wave length of atom at TK absolute temperature will be

(A) $\frac{h}{mKT}$ (B) $\frac{h}{\sqrt{3mKT}}$

(C) $\frac{\sqrt{2mKT}}{h}$ (D) $\sqrt{2mKT}$

18) If the wave length of light is 4000A°, then the number of waves in 1 mm length will be _____.

(A) 25 (B) 2500

(C) 250 (D) 25000

19) The frequencies of X rays, γ rays and Ultra violet rays are respectively p, q and r then

(A) $p<q, q>r$ (B) $p>q, q>r$

(C) $p<q, q<r$ (D) $p>q, q<r$

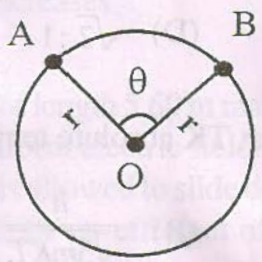
20) Photons having energy 1eV and 2.5 eV successively incident on a metal, having work function is 0.5 eV. The ratio of maximum speed of emitted electrons is

(A) 1 : 2 (B) 2 : 1

(C) 3 : 1 (D) 1 : 3

(Space for Rough Work)

21) A and B are two points on a uniform ring of radius r. The resistance of the ring is R. $\angle AOB = \theta$ as shown in the figure. The equivalent resistance between points A & B is _____.



(A) $\frac{R\theta}{2\pi}$

(B) $\frac{R(2\pi-\theta)}{4\pi}$

(C) $R\left(1-\frac{\theta}{2\pi}\right)$

(D) $\frac{R}{4\pi^2}(2\pi-\theta)\theta$

22) Two wires of equal length and equal diameter and having resistivities ρ_1 and ρ_2 are connected in series. The equivalent resistivity of the combination is _____.

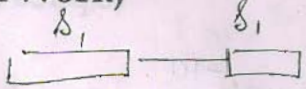
(A) $(\rho_1+\rho_2)$

(B) $\frac{\rho_1+\rho_2}{2}$

(C) $\frac{\rho_1\rho_2}{\rho_1+\rho_2}$

(D) $\sqrt{\rho_1\rho_2}$

(Space for Rough Work)



23) Match the following two columns.

	Column I		Column II
a)	Electrical resistance	p)	$ML^3T^{-3}A^{-2}$
b)	Electrical potential	q)	$ML^2T^{-3}A^{-2}$
c)	Specific resistance	r)	$ML^2T^{-3}A^{-1}$
d)	Specific conductance	s)	None of these

(A) $a-q, b-s, c-r, d-p$

(B) $a-q, b-r, c-p, d-s$

(C) $a-p, b-q, c-s, d-r$

(D) $a-p, b-r, c-q, d-s$

24) Angle of minimum deviation for a prism of refractive index 1.5 is equal to the angle of prism of given prism. Then the angle of prism is _____ ($\sin 48°36' = 0.75$)

(A) 41°24'

(B) 80°

(C) 60°

(D) 82°48'

25) A ray of light passes from a medium A having refractive index 1.6 to the medium B having refractive index 1.5. The value of critical angle of medium A is _____.

(A) $\sin^{-1}\left(\frac{16}{15}\right)$

(B) $\sin^{-1}\sqrt{\frac{16}{15}}$

(C) $\sin^{-1}\left(\frac{1}{2}\right)$

(D) $\sin^{-1}\left(\frac{15}{16}\right)$

(Space for Rough Work)

26) The power of plane mirror is _____.

(A) ∞ (B) 0

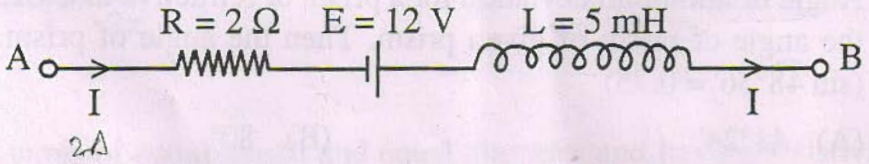
(C) 2D (D) 4D

27) Light waves travel from optically rarer medium to optically denser medium. Its velocity decreases because of change in _____

(A) frequency (B) wavelength

(C) amplitude (D) phase

28) The Network shown in Figure is a part of the circuit. (The battery has negligible resistance)



At a certain instant the current I = 2 A and it is decreasing at the rate of 10^2 As^{-1}. What is the potential difference between the points B and A?

(A) 8.0 V (B) 8.5 V

(C) 10 V (D) 15 V

29) A rod of 10 cm length is moving perpendicular to uniform magnetic field of intensity 5×10^{-4} Wb/m^2. If the acceleration of the rod is 5 m/s^2, then the rate of increase of induced emf is _____.

(A) 2.5×10^{-4} Vs^{-1} (B) 25×10^{-4} Vs

(C) 20×10^{-4} Vs (D) 20×10^{-4} Vs^{-1}

(Space for Rough Work)

$\frac{V-u}{t} = a$

$\frac{v}{t} = 5$

$\varepsilon = Blv$

$= 5 \times 10^{-4} \times 10^{-2} \times 5$

$= 25 \times 10^{-6}$

$\varepsilon = Blv$

$b = l$

Wb/m² × m

30) A current of $\frac{25}{\pi}$ Hz frequency is passing through an A.C. circuit having series combination of R = 100 Ω and L = 2 H, the phase difference between voltage and current is _____

(A) 90° (B) 60°

(C) 30° (D) 45°

31) In A.C. circuit having only capacitor, the current _____.

(A) lags behind the voltage by $\frac{\pi}{2}$ in phase

(B) leads the voltage by $\frac{\pi}{2}$ in phase

(C) leads the voltage by π in phase

(D) lags behind the voltage by π in phase

32) An alternating voltage given as $V = 100\sqrt{2}\sin 100t$ volt is applied to a capacitor of 1 μF. The current reading of the ammeter will be equal to _____ mA.

(A) 10 (B) 20

(C) 40 (D) 80

33) The distance of the closest approach of an alpha particle fired at a nucleus with kinetic energy K is r_0. The distance of the closest approach when the α particle is fired at the same nucleus with kinetic energy 2K will be

(A) $\frac{r_0}{2}$ (B) $4r_0$

(C) $\frac{r_0}{4}$ (D) $2r_0$

(Space for Rough Work)

$V_0 = I R$

$100\sqrt{2}$

34) Number of spectral line in hydrogen atom is

(A) 6 (B) 8

(C) 15 (D) α

35) A radioactive element X disintegrates successively as under

$$X \xrightarrow{\beta^-} X_1 \xrightarrow{\alpha} X_2 \xrightarrow{\beta^-} X_3 \xrightarrow{\alpha} X_4$$

If atomic number and atomic mass number of X are respectively 72 and 180, what are the corresponding values for X_4?

(A) 69, 176 (B) 69, 172

(C) 71, 176 (D) 70, 172

36) The energy released by the fission of one uranium atom is 200 MeV. The number of fission per second required to produce 6.4 W power is _____.

(A) 10^{11} (B) 2×10^{11}

(C) 10^{10} (D) 2×10^{10}

37) If by successive disintegration of ${}_{92}U^{238}$, the final product obtained is ${}_{82}Pb^{206}$, then how many number of α and β particles are emitted?

(A) 8 and 6 (B) 6 and 8

(C) 12 and 6 (D) 8 and 12

(Space for Rough Work)

38) A change of 0.04 V takes place between the base and the emitter when an input signal is connected to the CE transistor amplifier. As a result , 20 μA change take place in the base current and a change of 2 mA takes place in the collector current. Find the input resistance and A.C. current gain.

(A) 2kΩ, 100 (B) 1kΩ, 100

(C) 2kΩ, 200 (D) 1kΩ, 200

39) A plane polarized light is incident normally on a tourmaline plate. Its $\vec{E}$ vectors make an angle of 60° with the optic axis of the plate. Find the percentage difference between initial and final intensities.

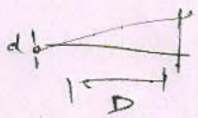
(A) 25% (B) 50%

(C) 75% (D) 90%

40) Light of wave length λ is incident on slit of width d. The resulting diffraction pattern is observed on a screen placed at distance D. The linear width of central maximum is equal to width of the slit, then D = _____.

(A) $\frac{d^2}{2\lambda}$ (B) $\frac{2\lambda^2}{d}$

(C) $\frac{d}{\lambda}$ (D) $\frac{2\lambda}{d}$



(Space for Rough Work)