SAMPLE QUESTION PAPER

INSTITUTE NAME & LOGO

MHT-CET – EXAM YEAR

Phy : Full Portion Paper

Question Booklet Version	Roll No.	Question Booklet Sr. No.
(Write this number on your Answer Sheet)	**Answer Sheet No.**	(Write this number on your Answer Sheet)

Duration: 45 Minutes Total Marks: 50

This is to certify that, the entries of MHT-CET Roll No. and Answer Sheet No. have been correctly written and verified.

Candidate's Signature **Invigilator's Signature**

Instructions To Candidate

1. This question booklet contains 50 Objective Type Ques. in the subject of Physics (50).
2. The question papers and OMR (Optical Mark Reader) Answer Sheets are issued separately at the start of the examination
3. Choice and sequence for attempting questions will be as per the convenience of the candidate
4. Candidate should carefully read the instructions printed on the Question Booklet and Answer Sheet and make the correct entries on the Answer Sheet. As Answer Sheets are designed to suit the OPTICAL MARK READER (OMR) SYSTEM, special care should be taken to mark the entries correctly. Special care should be taken to fill QUESTION BOOKLET VERSION, SERIAL No. and MHT-CET Roll No. accurately. The correctness of entries has to be cross-checked by the invigilators. The candidate must sign on the Answer Sheet and Question Booklet
5. Read each question carefully.
6. Determine the correct answer from out of the four available options given for each question.
7. Fill the appropriate circle completely like this ●, for answering a particular question. Mark with Black ink ball point pen only.
8. Each answer with correct response shall be awarded one (1) mark for Physics. **There is no Negative Marking. No mark shall be awarded for marking two or more answers of same question, scratching or overwriting.**
9. **Use of whitener or any other material to erase/hide the circle once filled is not permitted.**
10. Avoid overwriting and/or striking of answer once marked.
11. Rough work should be done only on the blank space provided on the Question Booklet. Rough work should not be done on the Answer Sheet.
12. The required mathematical tables (Log etc.) will be provided along with the question booklet.
13. Immediately after the prescribed examination time is over, the Question Booklet and Answer sheet is to be returned to the invigilator. Confirm that both the candidate and invigilator have signed on question booklet and Answer sheet.
14. No candidate is allowed to leave the examination hall till the Paper gets over.

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Time : 45 Min	**Phy : Full Portion Paper**	**Marks : 50**

01) If the surface tension of a soap solution is 0.03 MKS units, then the excess of pressure inside a soap bubble of diameter 6 mm over the atmospheric pressure will be
A) less than 20 N/m².
B) greater than 20 N/m².
C) less than 40 N/m.
D) greater than 40 N/m².

02) If pressure of a gas contained in a closed vessel is increased by 0.4% when heated by 1°C, the initial temperature must be
A) 25°C B) 250°C
C) 250 K D) 2500 K

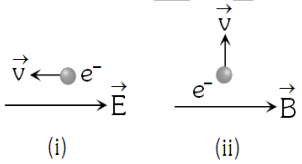
03) If an interference pattern have maximum and minimum intensities in 36 : 1 ratio, then what will be the ratio of amplitudes?
A) 7 : 5 B) 7 : 4
C) 5 : 7 D) 4 : 7

04) The frequency of light ray having the wavelength 3000 Å is
A) 90 cycles/s B) 3000 cycles/s
C) 9×10^{13} cycles/s D) 10^{15} cycles/s

05) A metal surface of work function 1.07 eV is irradiated with light of wavelength 332 nm. The retarding potential required to stop the escape of photo-electrons is
A) 1.07 eV B) 2.66 eV
C) 3.74 eV D) 4.81 eV

06) Deuteron and $\alpha-$ particle are put 1 Å apart in air. Magnitude of intensity of electric field due to deuteron at $\alpha-$particle is
A) 5.76 x 10^{11} newton/coulomb
B) 1.44 x 10^{11} newton/coulomb
C) 2.88 x 10^{11} newton/coulomb
D) Zero

07) An electron is moving through a field. It is moving (i) opposite an electric field (ii) perpendicular to a magnetic field as shown below. For each situation, the de-Broglie wavelength of electron is



A) same, same.
B) decreasing, same.
C) increasing, decreasing.
D) increasing, increasing.

08) Atomic power station at Tarapore has a generating capacity of 200 MW. The energy generated in a day by this station is
A) 1728×10^{10} J B) 4800×10^{6} J
C) 200 J D) 200 MW

09) Which two of the given transverse waves will give stationary waves when get superimposed?
$z_1 = a\cos(kx - \omega t)$ .....(A)
$z_2 = a\cos(kx + \omega t)$ .....(B)
$z_3 = a\cos(ky - \omega t)$ .....(C)
A) Any two B) B and C
C) A and C D) A and B

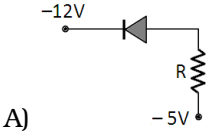
10) 1 mg gold undergoes decay with 2.7 days half-life period, amount left after 8.1 days is
A) 0.125 mg B) 0.25 mg
C) 0.5 mg D) 0.91 mg

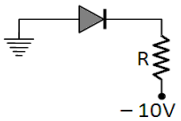
11) A player with 3 m long iron rod runs towards east with a speed of 30 km/hr. Horizontal component of earth's magnetic field is 4×10^{-5} Wb/m². If he is running with rod in horizontal and vertical positions, then the potential difference induced between the two ends of the rod in two cases will be
A) 1×10^{-3} V in vertical position and zero is horizontal position.
B) zero in vertical position and 1×10^{-3} V in horizontal position.
C) zero in both cases.
D) 1×10^{-3} V in both cases.

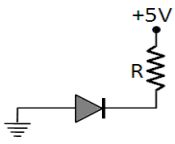
12) Mass M is divided into two parts xM and (1 - x)M. For a given separation, the value of x for which the gravitational attraction between the two pieces becomes maximum is
A) 2 B) 1
C) $\frac{3}{5}$ D) $\frac{1}{2}$

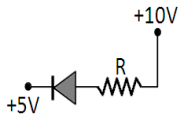
13) For a gas if $\gamma = 1.4$, then atomicity, C_p and C_v of the gas are respectively
A) Triatomic, $\frac{7}{2}R, \frac{5}{2}R$
B) Diatomic, $\frac{7}{2}R, \frac{5}{2}R$
C) Monoatomic, $\frac{7}{2}R, \frac{5}{2}R$
D) Monoatomic, $\frac{5}{2}R, \frac{3}{2}R$

14) Of the diodes shown in the following diagrams, which one is reverse biased?

A) 

B) 

C) 

D) 

15) A rectangular coil of 20 turns and area of cross - section 25 sq. cm has a resistance of 100 ohm. If a magnetic field which is perpendicular to the plane of the coil changes at the rate of 1000 Tesla per second, the current in the coil is
A) 0.5 ampere B) 1.0 ampere
C) 5.0 ampere D) 50 ampere

16) If the earth shrinks such that its mass does not change but radius decreases to one quarter of its original value, then one complete day will take
A) 1.5 hrs B) 6 hrs
C) 12hrs D) 24 hrs

17) Acceleration due to gravity is 'g' on the surface of the earth. The value of acceleration due to gravity at a height of 32 km above earth's surface is (Radius of the earth = 6400 km)
A) 0.8 g B) 0.9 g
C) 0.99 g D) 1.01 g

18) A car is moving with speed 30 m/s on a circular path of radius 500 m. Its speed is increasing at the rate of 2 m/s^2, What is the acceleration of the car?
A) $1.8\ m/s^2$ B) $2\ m/s^2$
C) $2.7\ m/s^2$ D) $9.8\ m/s^2$

19) In Young's double slit experiment, carried out with light of wavelength λ = 5000 Å, the distance between the slits is 0.2 mm and the screen is at 200 cm from the slits. The central maximum is at x =0. The third maximum (taking the central maximum as zeroth maximum) will be at x equal to
A) 5.0 cm B) 1.67 cm
C) 1.5 cm D) 0.5 cm

20) The time period of a simple pendulum of length L as measured in an elevator descending with acceleration $\frac{g}{3}$ is
A) $2\pi\sqrt{\frac{2L}{3g}}$ B) $2\pi\sqrt{\left(\frac{3L}{2g}\right)}$
C) $\pi\sqrt{\left(\frac{3L}{g}\right)}$ D) $2\pi\sqrt{\frac{3L}{g}}$

21) The range over which frequencies in information signal vary is
A) Q-factor. B) admittance.
C) power. D) bandwidth.

22) If the volume of the given mass of a gas is increased four times, the temperature is raised from 27° C to 127° C. The elasticity will become
A) 1/3 times. B) 1/4 times.
C) 3 times. D) 4 times.

23) The waves used in telecommunication are
A) cosmic rays. B) microwave.
C) UV. D) IR.

24) A power transformer is used to step up an alternating e. m. f. of 220 V to 11 kV to transmit 4.4 kW of power. If the primary coil has 1000 turns, what is the current rating of the secondary? Assume 100% efficiency for the transformer.
A) 0.04 A B) 0.4 A
C) 0.2 A D) 4 A

25) A bar magnet when placed at an angle of 30° to the direction of magnetic field induction of 5×10^{-2} T, experiences a moment of couple 25×10^{-6} N-m. If the length of the magnet is 5 cm its pole strength is
A) 2 A-m B) 5 A-m
C) 2 x 10^{-2} A-m D) 5 x 10^{-2} A-m

26) When a ferromagnetic material is heated to temperature above its Curie temperature, the material
A) behaves like a paramagnetic material.
B) behaves like a diamagnetic material.
C) remains ferromagnetic.
D) is permanently magnetized.

27) A charge q is located at the center of a cube. The electric flux through any face is
A) $\frac{4\pi q}{6(4\pi\varepsilon_0)}$ B) $\frac{2\pi q}{6(4\pi\varepsilon_0)}$
C) $\frac{\pi q}{6(4\pi\varepsilon_0)}$ D) $\frac{q}{6(4\pi\varepsilon_0)}$

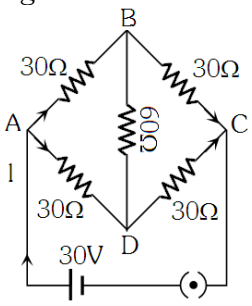
28) Polarizing angle for water is 53°4'. If light is incident at this angle on the surface of water and reflected, the angle of refraction is
A) 30°4' B) 36°56'
C) 53°4' D) 126°56'

29) The distance of Neptune and Saturn from sun are nearly 10^{13} and 10^{12} meters respectively. Assuming that they move in circular orbits, their periodic times will be in the ratio
A) $10\sqrt{10}$ B) $1/\sqrt{10}$
C) $\sqrt{10}$ D) 100

30) A wire in the form of a circular loop of one turn carrying a current produces a magnetic field B at the center. If the same wire is looped into a coil of two turns and carries the same current, the new value of magnetic induction at the center is
A) 2 B B) 3 B
C) 4 B D) 5 B

31) A liquid does not wet the sides of a solid, if the angle of contact is
A) 0°
B) Acute (Less than 90°)
C) 90°
D) Obtuse (More than 90°)

32) The current between B and D in the given figure is



A) 0.5 amp B) 1 amp
C) 2 amp D) Zero

33) Two springs of constant k_1 and k_2 are joined in series. The effective spring constant of the combination is given by
A) $k_1k_2/(k_1+k_2)$
B) k_1+k_2
C) $(k_1+k_2)/2$
D) $\sqrt{k_1k_2}$

34) Two wires that are made up of two different materials whose specific resistance are in the ratio 2 : 3, length 3 : 4 and area 4 : 5. The ratio of their resistances is
A) 1 : 2 B) 5 : 8
C) 6 : 8 D) 6 : 5

35) Two wires A and B are of same materials. Their lengths are in the ratio 1 : 2 and diameters are in the ratio 2 : 1 when stretched by force F_A and F_B respectively they get equal increase in their lengths. Then the ratio F_A/F_B should be
A) 8 : 1 B) 2 : 1
C) 1 : 2 D) 1 : 1

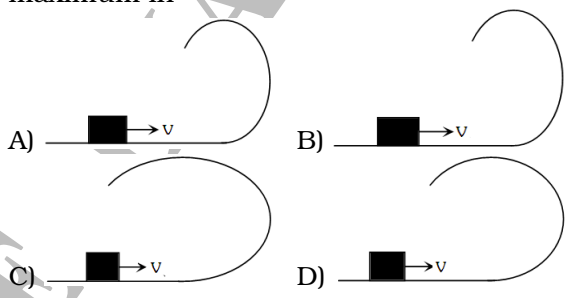
36) An $\alpha-$ particle travels in a circular path of radius 0.45 m in a magnetic field $B=1.2\,Wb/m^2$ with a speed of $2.6\times10^7\,m/s$. The period of revolution of the $\alpha-$ particle is
A) 1.1×10^{-8} s
B) 1.1×10^{-7} s
C) 1.1×10^{-6} s
D) 1.1×10^{-5} s

37) Three equal charges are placed on the three corners of a square. If the force between q_1 and q_2 is F_{12} and that between q_1 and q_3 is F_{13}, the ratio of magnitudes $\frac{F_{12}}{F_{13}}$ is
A) $\sqrt{2}$ B) $1/\sqrt{2}$
C) 2 D) 1/2

38) Change in frequency due to Doppler's effect is produced, when
A) there is resultant motion between the source and observer.
B) there is a relative motion between the source and the observer.
C) the source and the observer both are at rest.
D) the source and the observer are moving in the same direction.

39) Force necessary to pull a circular plate of 5 cm radius from water surface for which surface tension is 75 dynes/cm, is
A) 750π dynes B) 750 dynes
C) 60 dynes D) 30 dynes

40) A small block is shot into each of the four tracks as shown below. Each of the tracks rises to the same height. The speed with which the block enters the track is the same in all cases. At the highest point of the track, the normal reaction is maximum in



41) A triangular loop of side l carries a current I. It is placed in a magnetic field B such that the plane of the loop is in the direction of B. The torque on the loop is
A) $\frac{\sqrt{3}}{4}IBl^2$ B) $\frac{\sqrt{3}}{2}Il^2B^2$
C) IBl D) Zero

42) The kinetic energy of the electron in an orbit of radius r in hydrogen atom is (e = electronic charge)
A) $\frac{e^2}{2r^2}$ B) $\frac{e^2}{r}$
C) $\frac{e^2}{2r}$ D) $\frac{e^2}{r^2}$

43) A wheel having moment of inertia 2kg-m² about its vertical axis, rotates at the rate of 60 rpm about this axis. The torque which can stop the wheel's rotation in one minute would be
A) $\frac{\pi}{18}N-m$ B) $\frac{\pi}{15}N-m$
C) $\frac{\pi}{12}N-m$ D) $\frac{2\pi}{15}N-m$

44) The displacement y of a particle in a medium can be expressed as:
$y=10^{-6}\sin(100t+20x+\pi/4)$ m, where t is in second and x in meter. The speed of wave is
A) $5\pi\,m/s$ B) 5 m/s
C) 20 m/s D) 2000 m/s

45) From a circular ring of mass M and radius R, an arc corresponding to a 90^{o} sector is removed. The moment of inertia of the remaining part of the ring about an axis passing through the centre of the ring and perpendicular to the plane of the ring is k times MR^2. Then the value of k is

A) 1 B) 1/4
C) 3/4 D) 7/8

46) The length of a sonometer wire tuned to a frequency of 250 Hz is 0.60 metre. The frequency of tuning fork with which the vibrating wire will be in tune when the length is made 0.40 metre is

A) 384 Hz B) 375 Hz
C) 256 Hz D) 250 Hz

47) A micro-wave and an ultrasonic sound wave have the same wavelength. Their frequencies are in the ratio (approximately)

A) 10 : 1 B) 10^2 : 1
C) 10^4 : 1 D) 10^6 : 1

48) A 0.10 kg block oscillates back and forth along a horizontal surface. Its displacement from the origin is given by: $x = (10\ \text{cm})\cos[(10\ \text{rad/s})\,t + \pi/2\ \text{rad}]$. What is the maximum acceleration experienced by the block?

A) $\frac{10\pi}{3}\ \text{m/s}^2$ B) $\frac{10\pi}{2}\ \text{m/s}^2$
C) $10\,\pi\ \text{m/s}^2$ D) $10\ \text{m/s}^2$

49) The r. m. s. speed of the molecules of a gas at a pressure 10^5 Pa and temperature 0°C is $0.5\ \text{km s}^{-1}$. If the pressure is kept constant but temperature is raised to 819°C, the velocity will become

A) 1 kms^{-1} B) 1.5 kms^{-1}
C) 2 kms^{-1} D) 5 kms^{-1}

50) Which of the energy band diagrams shown in the figure corresponds to that of a semiconductor?