

# FINAL NEET(UG)-2020 EXAMINATION

(Held On Sunday 13<sup>th</sup> SEPTEMBER, 2020)

## PHYSICS

## TEST PAPER WITH ANSWER

1. The color code of a resistance is given below



The values of resistance and tolerance, respectively, are :

- (1) 470  $\Omega$ , 5%                      (2) 470 k $\Omega$ , 5%  
 (3) 47 k $\Omega$ , 10%                      (4) 4.7 k $\Omega$ , 5%

**Ans. (1)**

2. Find the torque about the origin when a force of  $3\hat{j}$  N acts on a particle whose position vector is  $2\hat{k}$  m :

- (1)  $6\hat{k}$  Nm                                  (2)  $6\hat{i}$  Nm  
 (3)  $6\hat{j}$  Nm                                  (4)  $-6\hat{i}$  Nm

**Ans. (4)**

3. A cylinder contains hydrogen gas at pressure of 249 kPa and temperature 27°C. Its density is : ( $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$ )

- (1) 0.02 kg/m<sup>3</sup>                              (2) 0.5 kg/m<sup>3</sup>  
 (3) 0.2 kg/m<sup>3</sup>                              (4) 0.1 kg/m<sup>3</sup>

**Ans. (3)**

4. Two cylinders A and B of equal capacity are connected to each other via a stop cock. A contains an ideal gas at standard temperature and pressure. B is completely evacuated. The entire system is thermally insulated. The stop cock is suddenly opened. The process is :

- (1) isobaric                                  (2) isothermal  
 (3) adiabatic                                (4) isochoric

**Ans. (3)**

5. Two particles of mass 5 kg and 10 kg respectively are attached to the two ends of a rigid rod of length 1 m with negligible mass.

The centre of mass of the system from the 5 kg particle is nearly at a distance of :

- (1) 80 cm                                    (2) 33 cm  
 (3) 50 cm                                    (4) 67 cm

**Ans. (4)**

6. A ray is incident at an angle of incidence  $i$  on one surface of a small angle prism (with angle of prism  $A$ ) and emerges normally from the opposite surface. If the refractive index of the material of the prism is  $\mu$ , then the angle of incidence is nearly equal to:

- (1)  $\frac{\mu A}{2}$                       (2)  $\frac{A}{2\mu}$                       (3)  $\frac{2A}{\mu}$                       (4)  $\mu A$

**Ans. (4)**

7. A body weighs 72 N on the surface of the earth. What is the gravitational force on it, at a height equal to half the radius of the earth?

- (1) 24 N                                      (2) 48 N  
 (3) 32 N                                      (4) 30 N

**Ans. (3)**

8. An iron rod of susceptibility 599 is subjected to a magnetising field of 1200 A m<sup>-1</sup>. The permeability of the material of the rod is :

( $\mu_0 = 4\pi \times 10^{-7} \text{ Tm A}^{-1}$ )

- (1)  $2.4\pi \times 10^{-7} \text{ Tm A}^{-1}$   
 (2)  $2.4\pi \times 10^{-4} \text{ Tm A}^{-1}$   
 (3)  $8.0 \times 10^{-5} \text{ Tm A}^{-1}$   
 (4)  $2.4\pi \times 10^{-5} \text{ Tm A}^{-1}$

**Ans. (2)**

9. For transistor action, which of the following statements is **correct**?

- (1) The base region must be very thin and lightly doped.  
 (2) Base, emitter and collector regions should have same doping concentrations.  
 (3) Base, emitter and collector regions should have same size.  
 (4) Both emitter junction as well as the collector junction are forward biased.

**Ans. (1)**

10. Light with an average flux of 20 W/cm<sup>2</sup> falls on a non-reflecting surface at normal incidence having surface area 20 cm<sup>2</sup>. The energy received by the surface during time span of 1 minute is :

- (1)  $48 \times 10^3 \text{ J}$                               (2)  $10 \times 10^3 \text{ J}$   
 (3)  $12 \times 10^3 \text{ J}$                               (4)  $24 \times 10^3 \text{ J}$

**Ans. (4)**

11. A short electric dipole has a dipole moment of  $16 \times 10^{-9} \text{ C m}$ . The electric potential due to the dipole at a point at a distance of 0.6 m from the centre of the dipole, situated on a line making an angle of  $60^\circ$  with the dipole axis is :

$$\left( \frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2 \right)$$

- (1) zero (2) 50 V  
(3) 200 V (4) 400 V

Ans. (3)

12. A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80 m/s. The height of the tower is : ( $g = 10 \text{ m/s}^2$ )

- (1) 300 m (2) 360 m  
(3) 340 m (4) 320 m

Ans. (1)

13. A resistance wire connected in the left gap of a metre bridge balances a  $10 \Omega$  resistance in the right gap at a point which divides the bridge wire in the ratio 3 : 2. If the length of the resistance wire is 1.5 m, then the length of  $1 \Omega$  of the resistance wire is :

- (1)  $1.5 \times 10^{-2} \text{ m}$  (2)  $1.0 \times 10^{-2} \text{ m}$   
(3)  $1.0 \times 10^{-1} \text{ m}$  (4)  $1.5 \times 10^{-1} \text{ m}$

Ans. (3)

14. When a uranium isotope  ${}_{92}^{235}\text{U}$  is bombarded with a neutron, it generates  ${}_{36}^{89}\text{Kr}$ , three neutrons and:

- (1)  ${}_{36}^{103}\text{Kr}$  (2)  ${}_{56}^{144}\text{Ba}$   
(3)  ${}_{40}^{91}\text{Zr}$  (4)  ${}_{36}^{101}\text{Kr}$

Ans. (2)

15. A long solenoid of 50 cm length having 100 turns carries a current of 2.5 A. The magnetic field at the centre of the solenoid is :

$$(\mu_0 = 4\pi \times 10^{-7} \text{ T m A}^{-1})$$

- (1)  $3.14 \times 10^{-5} \text{ T}$   
(2)  $6.28 \times 10^{-4} \text{ T}$   
(3)  $3.14 \times 10^{-4} \text{ T}$   
(4)  $6.28 \times 10^{-5} \text{ T}$

Ans. (2)

16. The average thermal energy for a mono-atomic gas is : ( $k_B$  is Boltzmann constant and T, absolute temperature )

- (1)  $\frac{7}{2}k_B T$  (2)  $\frac{1}{2}k_B T$   
(3)  $\frac{3}{2}k_B T$  (4)  $\frac{5}{2}k_B T$

Ans. (3)

17. A capillary tube of radius r is immersed in water and water rises in it to a height h. The mass of the water in the capillary is 5g. Another capillary tube of radius 2r is immersed in water. The mass of water that will rise in this tube is :

- (1) 20.0 g (2) 2.5 g  
(3) 5.0 g (4) 10.0 g

Ans. (4)

18. The ratio of contributions made by the electric field and magnetic field components to the intensity of an electromagnetic wave is :

(c = speed of electromagnetic waves)

- (1) 1 :  $c^2$  (2) c : 1  
(3) 1 : 1 (4) 1 : c

Ans. (3)

19. Assume that light of wavelength 600 nm is coming from a star. The limit of resolution of telescope whose objective has a diameter of 2 m is :

- (1)  $6.00 \times 10^{-7} \text{ rad}$  (2)  $3.66 \times 10^{-7} \text{ rad}$   
(3)  $1.83 \times 10^{-7} \text{ rad}$  (4)  $7.32 \times 10^{-7} \text{ rad}$

Ans. (2)

20. A wire of length L, area of cross section A is hanging from a fixed support. The length of the wire changes to  $L_1$  when mass M is suspended from its free end. The expression for Young's modulus is :

- (1)  $\frac{MgL}{A(L_1 - L)}$  (2)  $\frac{MgL_1}{AL}$   
(3)  $\frac{Mg(L_1 - L)}{AL}$  (4)  $\frac{MgL}{AL_1}$

Ans. (1)

21. The energy required to break one bond in DNA is  $10^{-20} \text{ J}$ . This value in eV is nearly :

- (1) 0.006 (2) 6  
(3) 0.6 (4) 0.06

Ans. (4)

**22.** In a certain region of space with volume  $0.2 \text{ m}^3$  the electric potential is found to be  $5 \text{ V}$  throughout. The magnitude of electric field in this region is :

- (1)  $5 \text{ N/C}$  (2) Zero  
 (3)  $0.5 \text{ N/C}$  (4)  $1 \text{ N/C}$

**Ans. (2)**

**23.** The mean free path for a gas, with molecular diameter  $d$  and number density  $n$  can be expressed as :

- (1)  $\frac{1}{\sqrt{2} n^2 \pi^2 d^2}$  (2)  $\frac{1}{\sqrt{2} n \pi d}$   
 (3)  $\frac{1}{\sqrt{2} n \pi d^2}$  (4)  $\frac{1}{\sqrt{2} n^2 \pi d^2}$

**Ans. (3)**

**24.** An electron is accelerated from rest through a potential difference of  $V$  volt. If the de Broglie wavelength of the electron is  $1.227 \times 10^{-2} \text{ nm}$ , the potential difference is :

- (1)  $10^4 \text{ V}$  (2)  $10 \text{ V}$   
 (3)  $10^2 \text{ V}$  (4)  $10^3 \text{ V}$

**Ans. (1)**

**25.** In a guitar, two strings A and B made of same material are slightly out of tune and produce beats of frequency  $6 \text{ Hz}$ . When tension in B is slightly decreased, the beat frequency increases to  $7 \text{ Hz}$ . If the frequency of A is  $530 \text{ Hz}$ , the original frequency of B will be:

- (1)  $537 \text{ Hz}$  (2)  $523 \text{ Hz}$   
 (3)  $524 \text{ Hz}$  (4)  $536 \text{ Hz}$

**Ans. (3)**

**26.** A  $40 \mu\text{F}$  capacitor is connected to a  $200 \text{ V}$ ,  $50 \text{ Hz}$  ac supply. The rms value of the current in the circuit is, nearly :

- (1)  $25.1 \text{ A}$  (2)  $1.7 \text{ A}$   
 (3)  $2.05 \text{ A}$  (4)  $2.5 \text{ A}$

**Ans. (4)**

**27.** The increase in the width of depletion region in a p-n junction diode is due to :

- (1) increase in forward current  
 (2) forward bias only  
 (3) reverse bias only  
 (4) both forward bias and reverse bias

**Ans. (3)**

**28.** The Brewsters angle  $i_b$  for an interface should be:

- (1)  $i_b = 90^\circ$  (2)  $0^\circ < i_b < 30^\circ$   
 (3)  $30^\circ < i_b < 45^\circ$  (4)  $45^\circ < i_b < 90^\circ$

**Ans. (4)**

**29.** The phase difference between displacement and acceleration of a particle in a simple harmonic motion is :

- (1) Zero (2)  $\pi \text{ rad}$   
 (3)  $\frac{3\pi}{2} \text{ rad}$  (4)  $\frac{\pi}{2} \text{ rad}$

**Ans. (2)**

**30.** A spherical conductor of radius  $10 \text{ cm}$  has a charge of  $3.2 \times 10^{-7} \text{ C}$  distributed uniformly. What is the magnitude of electric field at a point  $15 \text{ cm}$  from the centre of the sphere ?

$$\left( \frac{1}{4\pi \epsilon_0} = 9 \times 10^9 \text{ Nm}^2 / \text{C}^2 \right)$$

- (1)  $1.28 \times 10^7 \text{ N/C}$   
 (2)  $1.28 \times 10^4 \text{ N/C}$   
 (3)  $1.28 \times 10^5 \text{ N/C}$   
 (4)  $1.28 \times 10^6 \text{ N/C}$

**Ans. (3)**

**31.** The capacitance of a parallel plate capacitor with air as medium is  $6 \mu\text{F}$ . With the introduction of a dielectric medium, the capacitance becomes  $30 \mu\text{F}$ . The permittivity of the medium is :

$$(\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2})$$

- (1)  $5.00 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
 (2)  $0.44 \times 10^{-13} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
 (3)  $1.77 \times 10^{-12} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
 (4)  $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$

**Ans. (4)**

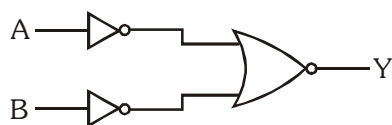
**32.** Taking into account of the significant figures, what is the value of  $9.99 \text{ m} - 0.0099 \text{ m}$  ?

- (1)  $9.9 \text{ m}$  (2)  $9.9801 \text{ m}$   
 (3)  $9.98 \text{ m}$  (4)  $9.980 \text{ m}$

**Ans. (3)**



42. For the logic circuit shown, the truth table is :



(1)	A	B	Y
	0	0	1
	0	1	0
	1	0	0
	1	1	0

(2)	A	B	Y
	0	0	0
	0	1	0
	1	0	0
	1	1	1

(3)	A	B	Y
	0	0	0
	0	1	1
	1	0	1
	1	1	1

(4)	A	B	Y
	0	0	1
	0	1	1
	1	0	1
	1	1	0

Ans. (2)

43. The energy equivalent of 0.5 g of a substance is:

- (1)  $0.5 \times 10^{13}$  J
- (2)  $4.5 \times 10^{16}$  J
- (3)  $4.5 \times 10^{13}$  J
- (4)  $1.5 \times 10^{13}$  J

Ans. (3)

44. For which one of the following, Bohr model is **not** valid ?

- (1) Singly ionised neon atom ( $\text{Ne}^+$ )
- (2) Hydrogen atom
- (3) Singly ionised helium atom ( $\text{He}^+$ )
- (4) Deuteron atom

Ans. (1)

45. The quantities of heat required to raise the temperature of two solid copper spheres of radii  $r_1$  and  $r_2$  ( $r_1 = 1.5 r_2$ ) through 1 K are in the ratio:

- (1)  $\frac{5}{3}$
- (2)  $\frac{27}{8}$
- (3)  $\frac{9}{4}$
- (4)  $\frac{3}{2}$

Ans. (2)

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