

## **COMEDK Sample Paper for Physics 2013**

1. The number of free electrons per 10 mm of an ordinary copper wire is  $2 \times 10^{21}$ . The average drift speed of the electrons is 0.25 mm/s. The current flowing is:

- A. 0.8 A
- B. 8 A
- C. 80 A
- D. 5 A

2. Which of the following cells is more likely to be damaged due to short circuiting?

- A. Daniel
- B. Dry
- C. Acid
- D. Fuel

3. A gas expands from 5 litre to 105 litres at a constant pressure 100N/m<sup>2</sup>. The work done is

- A. 1 Joule
- B. 4 Joule
- C. 8 Joule
- D. 10 Joule

4. The Helium nuclei can be formed from

- A. Hydrogen nuclei by process of chain reaction
- B. Hydrogen nuclei through nuclear fission
- C. Hydrogen nuclei through nuclear fusion
- D. None of these

5. In the atom bomb dropped by Americans in 1945 on Nagasaki, Japan, the fissionable material used was

- A. Helium 4
- B. Plutonium 239
- C. Uranium 235
- D. Uranium 233

6. The engine of a truck moving a straight road delivers constant power. The distance travelled by the truck in time  $t$  is proportional to

- A.  $t$
- B.  $t^2$
- C.  $\sqrt{t}$
- D.  $t^{3/2}$

7. The velocity of electron in ground state of hydrogen atom is

- A.  $2 \times 10^5$  m/s
- B.  $2 \times 10^6$  m/s
- C.  $2 \times 10^7$  m/s
- D.  $2 \times 10^8$  m/s

**8. The radius of the first orbit of the electron in a hydrogen atom is  $5.3 \times 10^{-11}$  m; then the radius of the second orbit must be**

- A.  $15.9 \times 10^{-11}$  m
- B.  $10.6 \times 10^{-11}$  m
- C.  $21.2 \times 10^{-11}$  m
- D.  $42.4 \times 10^{-11}$  m

**9. A person pushes a rock of 1010Kg mass by applying a force of only 10N for just 4 seconds. The work done is**

- A. 1000 Joule
- B. 0 J
- C. nearly zero
- D. Positive

**10. One can take pictures of objects which are completely invisible to the eye using camera films which are sensitive to**

- A. ultra-violet rays
- B. sodium light
- C. visible light
- D. infra-red rays

**11. Light from a 100 watt filament bulb is passed through an evacuated glass tube containing sodium vapour at a high temperature. If the transmitted light is viewed through a spectrometer having end D1 and D2, we will observe**

- A. D1 and D2 lines of sodium with good intensity
- B. dark lines where D1 and D2 lines should have been observed
- C. Continuous radiation from the bulb only.
- D. the entire emission spectrum of sodium

**12. Under the action of a constant force, a particle is experiencing a constant acceleration. The power is**

- A. zero
- B. Positive
- C. negative
- D. increasing uniformly with time

**13. If in a plane convex lens the radius of curvature of the convex surface is 10 cm and the focal length of the lens is 30 cm, the refractive index of the material of the lens will be**

- A. 1.5
- B. 1.66
- C. 1.33
- D. 3

14. A plane convex lens has radius of curvature 30 cm. If the refractive index is 1.33, the focal length of lens is

- A. 10 cm
- B. 90 cm
- C. 30 cm
- D. 60 cm

15. A beam of light is converging towards a point  $I$  on a screen. A plane parallel plate of glass (thickness in the direction of the beam =  $t$ , refractive index =  $\mu$ ) is introduced in the path of the beam. The convergence point is shifted by

- A.  $t(\mu - 1)$  away
- B.  $t(1 + 1/\mu)$  away
- C.  $t(1 - 1/\mu)$  nearer
- D.  $t(1 + 1/\mu)$  nearer

16. In Young's double slit experiment the separation between the slits is halved and the distance between the slits and screen is doubled. The fringe width will be

- A. unchanged
- B. halved
- C. Doubled
- D. quadrupled

17. Wavelength of red light is  $\lambda_r$ , violet rays is  $\lambda_v$  and X-ray is  $\lambda_x$  then the order of wavelengths is

- A.  $\lambda_x > \lambda_v > \lambda_r$
- B.  $\lambda_v > \lambda_x > \lambda_r$
- C.  $\lambda_r > \lambda_x > \lambda_v$
- D.  $\lambda_r > \lambda_v > \lambda_x$

18. The amount of work done by the labourer who carries  $n$  bricks, each of mass  $m$ , to the roof of a house whose height is  $h$  is

- A.  $n mgh$
- B.  $mgh/n$
- C. zero
- D.  $ghn/m$

19. In LCR circuit in the state of resonance, which of the following statements is correct ?  
( $\cos\phi$ )=

- A. 0
- B. 0.5
- C. 1
- D. None of these

20. In LCR circuit, phase difference between voltage and current cannot be

- A.  $80^\circ$
- B.  $90^\circ$
- C.  $145^\circ$
- D.  $0^\circ$

21. If speed is plotted along x-axis and Kinetic energy against y-axis, then the graph obtained has a shape similar to that of

- A. circle
- B. ellipse
- C. Hyperbola
- D. parabola

22. A magnetic needle lying parallel to a magnetic field requires  $w$  units of work to turn it through  $60^\circ$ . The torque needed to maintain the needle in this position will be

- A.  $(\sqrt{3}) w$
- B.  $W$
- C.  $(\sqrt{3}w)/2$
- D.  $2w$

23. A vertical straight conductor carries a current vertically upwards. A point  $p$  lies to the east of it at a small distance and another point  $Q$  lies to west of it at the same distance. The magnetic field at  $p$  is

- A. greater than at  $Q$
- B. same as at  $Q$
- C. less than at  $Q$
- D. greater or less at  $Q$  depending upon the strength of the current

24. In a parallel arrangement if  $(R_1 > R_2)$ , the power dissipated in resistance  $R_1$  will be

- A. less than  $R_2$
- B. same as  $R_2$
- C. more than  $R_2$
- D. none of these

25. For a fuse wire to be installed in the supply line in a house which one of the following is immaterial?

- A. the specific resistance of the material of the fuse wire
- B. the diameter of the fuse wire
- C. the length of the fuse wire
- D. none of these

26. If  $V$  is voltage applied,  $E_a$  is emf drop across the armature, the armature current of a d.c. motor  $I_a$  is given by

- A.  $(V + E_a)/R_a$
- B.  $E_a/R_a$
- C.  $V - E_a/R_a$
- D.  $V/R_a$

27. The current of 2.0 amperes passes through a cell of e.m.f. 1.5 volts having internal resistance of  $0.15\Omega$ . The potential difference measured in volts across both the terminals of the cell will be

- A. 1.35
- B. 1.50

- C. 1.00
- D. 1.20

**28. A cell of emf  $E$  is connected across a resistance  $r$ . The potential difference between the terminals of the cell is found to be  $V$ . The internal resistance of the cell must be**

- A.  $2(E - V)V/r$
- B.  $2(E - V)r/E$
- C.  $(E - V) r/V$
- D.  $(E - V)/r$

**30. Copper and germanium are both cooled to 70 K from room temperature, then**

- A. resistance of copper increases while that of germanium decreases
- B. resistance of copper decreases while that of germanium increases
- C. resistance of both decreases
- D. resistance of both increases

**32. A moving coil galvanometer has a resistance of  $9.8\Omega$  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 mini ammeter to measure current up to 500 mA is**

- A.  $0.02\Omega$
- B.  $0.2\Omega$
- C.  $2\Omega$
- D.  $0.4\Omega$

**33. If the plates of a charged parallel plate capacitor are pulled away from each other**

- A. capacitance increases
- B. energy increases
- C. voltage increases
- D. voltage decreases

**35. A parallel plate capacitor is charged by connecting its plates to the terminals of a battery. The battery remains connected and a glass plate is interposed between the plates of the capacitor, then**

- A. the charge on plates will be reduced
- B. the charge on plates will increase
- C. the potential difference between the plates of the capacitor will be reduced
- D. the potential difference between the plates of the capacitor will increase

**36. A person weighing 70 Kg wt lifts a mass of 30 Kg to the roof of a building 10 m high. If he takes 50 sec to do so, then the power spent is**

- A. 19.6 W
- B. 196 W
- C. 300 W
- D. 50 W

**37. Work done in carrying a charge  $q$  from  $A$  to  $B$  along a semi-circle is**

- A.  $2\pi r q$
- B.  $4\pi r q$

- C.  $\pi r q$
- D. 0

38. A particle A has charge  $+q$  and particle B has charge  $+4q$  with each of them having the same mass  $m$ . When allowed to fall from rest through same electrical potential difference, the ratio of their speed  $V_A : V_B$  will become

- A. 2:1
- B. 1:2
- C. 1:4
- D. 4:1

39. The electric field at a small distance  $R$  from an infinitely long plane sheet is directly proportional to

- A.  $R^2/2$
- B.  $R/2$
- C.  $R^{-2}$
- D. none of these

41. Wien's displacement law is given by

- A.  $\lambda m = \text{constant}$
- B.  $T/\lambda m = \text{constant}$
- C.  $\lambda m T = \text{constant}$
- D.  $T = \lambda m = \text{constant}$

42. If two electrons are forced to come closer to each other, then the potential energy

- A. becomes zero
- B. increases
- C. Decreases
- D. becomes infinite

43. The specific heat at constant pressure is greater than that of the same gas at constant volume because

- A. at constant volume work is done in expanding the gas
- B. at constant pressure work is done in expanding the gas
- C. the molecular attraction increases more at constant pressure
- D. the molecular vibration increases more at constant pressure

44. The specific heats of  $\text{CO}_2$  at constant pressure and constant volume are  $0.833 \text{ J/kg.K}$  and  $0.641 \text{ J/kg.K}$  respectively. If molecular weight of  $\text{CO}_2$  is 44, what is the universal constant  $R$ ?

- A.  $4.19 \times 10^7 \text{ erg/cal}$
- B.  $848.8 \text{ J/gm/K}$
- C.  $8.448 \text{ J/mol/K}$
- D.  $4.19 \text{ J/cal}$

45. The freezing point of the liquids decreases when pressure is increased, if the liquid

- A. expands while freezing
- B. contracts while freezing
- C. does not change in volume while freezing
- D. none

46. The equation of a transverse wave on a stretched string is given by  $y = 0.05 \sin \pi (2t/0.002 - x/0.1)$  where  $x$  and  $y$  are expressed in metres and  $t$  in sec. The speed of the wave is

- A. 100 m/sec
- B. 50 m/s
- C. 200 m/s
- D. 400 m/s

47. The ratio of velocity of the body to the velocity of sound is called

- A. Magic number
- B. Laplace number
- C. Natural number
- D. Mach number

48. Television signals on earth cannot be received at distances greater than 100 km from the transmission station. The reason behind this is that

- A. the receiver antenna is unable to detect the signal at a distance greater than 100 km
- B. the TV programme consists of both audio and video signals
- C. the TV signals are less powerful than radio signals
- D. the surface of earth is curved like a sphere

49. A ball is thrown from a height of  $h$  m with an initial downward velocity  $v_0$ . It hits the ground, loses half of its Kinetic energy & bounces back to the same height. The value of  $v_0$  is

- A.  $\sqrt{2gh}$
- B.  $\sqrt{gh}$
- C.  $\sqrt{3gh}$
- D.  $\sqrt{2.5gh}$

50. A thick rope of rubber of density  $1.5 \times 10^3 \text{ kg/m}^3$  and Young's modulus  $5 \times 10^6 \text{ N/m}^2$ , 8m in length, when hung from ceiling of a room, the increase in length due to its own weight is

- A.  $9.6 \times 10^{-3} \text{ m}$
- B.  $19.2 \times 10^{-5} \text{ m}$
- C. 9.6cm
- D. 9.6mm

51. Water is falling on the blades of a turbine at a rate 6000 Kg/min. The height of the fall is 100m. What is the power gained by the turbine?

- A. 10 KW
- B. 6 KW
- C. 100 KW
- D. 600 KW

52. If momentum of alpha-particle, neutron, proton, and electron are the same, the minimum K.E. is that of

- A. alpha-particle
- B. Neutron
- C. Proton
- D. Electron

53. An electric motor while lifting a given load produces a tension of 4500 N in the cable attached to the load. If the motor winds the cable at the rate of 2m/s, then power must be

- A. 9 kW
- B. 15 kW
- C. 225 kW
- D. 9000 H.P

54. If an electric iron electrons are accelerated through a potential difference of  $V$  volts. Taking electronic charge and mass to be respectively  $e$  and  $m$ , the maximum velocity attained by the electrons is

- A.  $2eV/\sqrt{m}$
- B.  $\sqrt{(2eV)/m}$
- C.  $2m/eV$
- D.  $\sqrt{2/8em}$

55. A particle is moving on a circular track of radius 20 cm with a constant speed of 6 m/s. Its acceleration is

- A. 0
- B. 180 m/s<sup>2</sup>
- C. 1.2 m/s<sup>2</sup>
- D. 36 m/s<sup>2</sup>

