1. Acceleration due to gravity g= 980 cm/sec^2. The value in km/min^2 is

   A) 9.8 B) 19.6 C)35.28 D) 49.46

2. The magnitudes of scalar and vector products of the two vectors are $48\sqrt{3}$ and 144. The angle between the vectors is

   A) 30^o B) 45^o C) 60^o D) 90^o

3. Two vectors $\bar{a}$ and $\bar{b}$ are at the angle of 60^o with each other. Their resultant makes an angle of 45 with $\bar{a}$. If $|b| = 4$ then $|a|$ is

   A) $(\sqrt{3}-1)$ B) $2(\sqrt{3}-1)$ C) $2(\sqrt{3}+1)$ D) $\sqrt{3}$

4. The velocity of a particle *v* changes with displacement *x* as $v = \sqrt{(25-6x)}$ m/sec. The acceleration of the particle is

   A) 5 m/s^2 B) 3 m/s^2 C) -3 m/s^2 D) -6 m/s^2

5. Two skaters have weight in the ratio 4:5 and are 9m apart, on a smooth friction less surface. They pull on a rope stretched between them. The ratio of distance covered by them when they meet each other will be

   A) 25 : 16 B) 16 : 25 C) 4 : 5 D) 5 : 4

6. The escape velocity of the body on the earth, from a height equal to radius of the earth R is

   A) $\sqrt{2gR}$ B) $\sqrt{gR}$ C) $\sqrt{4gR}$ D) $(\sqrt{2gR})/2$

7. A train of mass 3000 Ton is running with 72 km/h. The friction force acting between rails and wheels is 10 N/Ton. The power of the engine is

   A) 6 KW B) 600 KW C) 720 KW D) 3000 KW

8. If a cyclist moving with a speed of 4.9 m/sec on a level road takes a sharp circular turn of the radius 4m. Then the coefficient of friction between the cycle tires and road is

   A) 0.41 B) 0.51 C) 0.61 D) 0.71

9. A satellite is orbiting a planet at a certain height in a circular orbit. If the mass of the planet is suddenly reduced to half, the satellite would

   A) continue to revolve around the planet at the same speed.
   B) falls freely on the planet
   C) orbit the planet at the lesser speed
   D) escape from the planet

10. When a gas is supplied 'ΔQ' heat, it performs a work 'ΔW' the increase its an internal energy 'dU' is

    A) dU= $(\Delta W - \Delta Q)$ B) dU = $(\Delta Q + \Delta W)$

    C) dU= $(\Delta Q - \Delta W)$ D) dU= $(\Delta Q - \Delta W)/2$

11. The temperature at which Centigrade thermometer and Fahrenheit thermometer gives the same reading

    A) 40^oC B) -40^oC C) 160^oC D) -160^oC

12. A gas is filled in a container at some temperature and at pressure 76 cm of Hg. If at the same temperature the mass of the gas is increased by 50% then the resultant pressure will be

    A) 114 cm of Hg B) 76 cm of Hg

    C) 152 cm of Hg D) 38 cm of Hg

13. A Carnot engine takes heat from a reservoir at 527^oC and gives out to the sink at 127^oC. the efficiency of the engine will be
    A) 10% B) 30% C) 50% D) 70%

14. Two spheres A and B of same colour having radii 2 cm and 8 cm are maintained at a temperatures 327^oC and 27^oC respectively. The ratio of the rate of energy radiated by them is

    A) 0.25 B) 1 C) 0.5 D) 2

15. At what temperature a body does not emit heat energy?

    A) 373^oC B) 273^oC C) 0^oK D) 0^oC

16. How much work can be done by 250^oC calories of heat?

    A) 1050 J B)1045 erg C)1045 Watt D) Zero

17. If the value of $R = \frac{2}{5}C_v$ for a gas, then the gas will be

A) monatomic B) diatomic C) triatomic D) polyatomic

18. A wire of length 1m and radius 4 mm is clamped at one end the other end is twisted by an angle of 30°. Then the angle of shear is

A) 0.12° B) 12° C)1.2° D)120°

19. The longitudinal strain in a metal bar is 0.05. If the Poisson's ratio for the metal is 0.25, then the lateral strain is

A) 0.2 B) 0.3 C) 0.125 D) 0.0125

20. When a spring is stretched, the strain produced in the wire is

A) Longitudinal B) Volume C) Shearing D) All

21. Two rain drops reach the earth with different terminal velocities having ratio 9:4. Then the ratios of their volume is

A) 3 : 2 B) 4 : 9 C) 27 : 8 D) 9 : 4

22. The coefficient of viscosity of a liquid does not depend on

A) The density of liquid B) Pressure of liquid

C) Temperature of liquid D) Nature of liquid

23. The spherical bubbles of radii r_1 and r_2 coalesce in vacuum under isothermal conditions. The radius of the resulting bubble R is

A) $R = (r_1 \times r_2)/(r_1 + r_2)$ B) $R = (r_1 + r_2)/2$

C) $R = \sqrt{(r_1^2 + r_2^2)}$ D) $R = \sqrt{(r_1^3 + r_2^3)}$

24. A 8 μF capacitor is connected in parallel to 4 μF capacitor. The combination is then connected in series with 12 μF capacitor. The system is charged to 20 volt. The charge on 8 μF capacitor will be

A) 2.5 μC B) 40 μC C) 80 μC D) 250 μC

25. 3.2×10^{-19} coulomb charge exists on a hollow conducting sphere of radius 10 cm. The potential at a point of distance 4 cm from the centre will be

A) 288 V B) 1.6×10^{-19}V C) 2.88×10^{-8} V D) Zero

26. If the resistance of two bulbs of 200 watt and 100 watt working at the same voltage are R_1 and R_2 respectively, then

A) $R_2= 2\ R_1$ B) $R_2= 4\ R_1$ C) $R_1= 4R_2$ D) $R_1= 4R_2$

27. Two heater wires of equal lengths are first connected in parallel then in series. The ratio of heats produced in two cases will be

A) 1 : 2 B) 2 : 1 C) 4 : 1 D) 1 : 4

28. The charge in on a 3μF condenser is 6μC. The energy stored in the condenser will be

A) 0.5×10^{-6}J B) 2×10^{-6}J C) 4×10^{-6}J D) 6×10^{-6}J

29. The value of magnetic susceptibility for the paramagnetic substance is

A) Infinity B) Zero C) Low positive D) Low negative

30. The correct relation between magnetic susceptibility and relative permeability is

A) $\chi = \mu_r+1$ B) $\chi = \mu_r-1$ C) $\chi = \mu+1$ D) $\chi = \mu -1$

31. The ratio of magnetic inductions at the centre of a circular coil of radius ‘r’ and its axis at a distance equal to its radius, will be

A) $\sqrt{2}$ B) $1/\sqrt{2}$ C) $2\sqrt{2}$ D) $1/2\sqrt{2}$

32. The current in a coil changes from 1A to 3A in 0.05 seconds. If the average emf in the coil is 4 volt. Then the self inductance of the coil will be

A) 0.1 H B) 0.2 H C) 0.3 H D) 0.4 H

33. The capacitive reactance of a condenser of capacity 125 μF for an A.C of frequency 4000 Hz will be

A) $\pi\ \Omega$ B) $\frac{1}{\pi}\ \Omega$ C) $2\pi\ \Omega$ D) $\frac{1}{2\pi}\ \Omega$

34. A transformer changes 220 volt to 22 volt. If the current in the primary and secondary coils are 10 A to 70 A respectively then, its efficiency will be

A) 35% B) 50% C) 70% D) 90%

35. The nature of electro Magnetic wave is

A) Longitudinal B) Longitudinal stationary

C) Transverse D) Transverse stationary

36. A transverse wave is represented by $y = 2\sin(60t - 2x)$ and measurements in meters. Then the velocity of propagation is

A) 15 m/s B) 30 m/s C) 45 m/s D) 6o m/s

37. The velocity of approach of an observers towards a stationary source that the apparent frequency is double to real frequency is (velocity of sound in air 340m/s)

A) 165 m/s B) 260 m/s C) 340 m/s D) 680 m/s

38. A tuning fork of frequency 340 Hz is vibrated just above a cylindrical tube of length of 1m. water is slowly pored in. what is the minimum height of water required for resonance. Velocity of sound in air is 340 m/s

A) O.25 m B) 0.35 m C) 0.45 m D) 0.15 m

39. The temperature at which the velocity of sound in air is double to that of at $0°C$ is

A) 546°C B) 546K C) 819°C D) 819K

40. The displacement of particle executing simple harmonic motion is given by $y = 2\sin(0.5\pi t)$ cm its time period is

A) 2 sec B) 0.5 sec C) 3 sec D) 4sec

41. An erect image, three times the size of the object, is obtained with a concave mirror of radius of curvature 30 cm. The position of the objet from the mirror is

A) 10 cm B) 12 cm C) 15 cm D) 30 cm

42. Which of following phenomena is not explained by Huygens's construction of wave front?

A) Refraction B) Reflection C) Diffraction D) Origin of spectra

43. Two mono chromatic light waves of amplitudes A and 2A interfering at a point, have a phase difference of 60°. The intensity at that point will be proportional to

A) A^2 B) $2A^2$ B) $5\ A^2$ D) $7\ A^2$

44. A meniscus lens has convex surface 20 cm and concave surface 30 cm. If the lans is constructed of glass ($\mu = 1.5$), the local length will be

A) -40 cm B) +40 cm C) -120 cm D) +120 cm

45. The number of thermions emitted from a cathode does not depend on

A) Surface area of cathode B) Cathode temperature

C) Work function of cathode D) Specific heat of cathode

46. Triode valve can not be used as

A) Rectifier B) Amplifier C) A source of emf D) An Oscillator

47. How many diodes are used in a bridge rectifier

A) 1 B) 2 C) 3 D) 4

48. The depletion layer in a silicon diode is 1μm wide and its knee potential is 0.5 volt. Then electric field in the depletion layer will be

A) $0.5\ V/m$ B) $5\times 10^{-7} V/m$ C) $5\times 10^{5} V/m$ D)$2\times 10^{5} V/m$

49. The order of magnitude of current in the reverse bias connection of a junction diode is

A) A B) mA C) μA D) kA

50. A transition has $\alpha = 0.95$. The current amplification factor will be

A) 11 B) 19 C) 21 D) 35

51. The main cause of Zener break down is

A) The base semi conductor being germanium.
B) Production of electron-hole pair due to thermal excitation.
C) Low doping D) High doping

52. The rest mass of an electron is m_0 . what would be its mass if it moves with velocity 0.6c (c= velocity of light)

A) $\frac{1}{2}m_0$ B) $\frac{1}{6}m_0$ C) $\frac{4}{3}m_0$ D) $\frac{5}{4}m_0$

53. One of the postulates of special theory of relativity is

A) Speed of light is relative
B) Speed of the light is same in all inertial frames
C) Time is relative
D) Mass is relative

54. Einstein's mass energy relation ($E = mc^2$) show that

A) Mass disappear to reappear as energy
B) Energy disappear to re appear as mass
C) Mass and energy are two different forms of the same entity
D) All the statements are correct

55. The un decayed fraction of 1gram of radio active substance after 5 half lives will be

A) $\frac{1}{8}$ gram B) $\frac{1}{16}$ gram C) $\frac{1}{32}$ gram D) $\frac{1}{4}$ gram

56. From the following equation, find out the possible nuclear fusion reaction

A) ${}_6C^{13} + {}_1H^1 \rightarrow {}_6C^{14} + {}_{+1}e^0 + 4.3$ Mev
B) ${}_4Be^9 + {}_2He^4 \rightarrow {}_6C^{12} + {}_0n^1 + 5$ Mev
C) ${}_7N^{14} + {}_1H^1 \rightarrow {}_8O^{15} + 7.3$ Mev
D) ${}_{92}U^{235} + {}_0n^1 \rightarrow {}_{54}Xe^{140} + {}_{38}Sr^{94} + 2({}_0n^1) + 200$ Mev

57. The maximum binding energy for nucleon is for

A) Hydrogen B) Helium C) Iron D) Cobalt

58. Which of the following isotope is used for treatment of cancer

A) I^{131} B) Co^{60} C)K^{40} D) Sr^{90}

59. The radius of the nucleus varies with mass number A as

A) A^2 B) A^3 C) $A^{1/2}$ D) $A^{1/3}$

60. During a negative β-decay

A) An atomic electron is ejected
B) A neutron in the nucleus decay emitting an electron
C) An electron which is already present inside the nucleus is ejected
D) A part of binding energy of the nucleus is converting into an electron