PART – I

(Physics and Mathematics)

1. Which of the following is a device that converts digital computer signals into analog signals that can travel over phone lines and vice versa?

Ans: Modem

2. Which of the following refers to the vertical or horizontal placement of a graphic in relation to the chosen anchor point?

Ans: Alignment

3. Formulas in a Spreadsheet must begin with which of the following sign?

Ans: =

4. The angles of a triangle are in A. P. and the least angle is 30 degrees. The greatest angle in radians is

Ans: $\frac{\pi}{2}$

5. $\lim_{x\to 0}\frac{\left[(2+x)\sin(2+x)-2\sin 2\right]}{x} = ?$

Ans: $2\cos 2 + \sin 2$

6. If α and β are the roots of the quadratic equation $4x^2 + 3x + 7 = 0$, then the value of $\frac{1}{\alpha}+\frac{1}{\beta}$ is

Ans: $-\frac{3}{7}$

7. A kite is flying at an inclination of 60º with the horizontal plane. If the length of the thread is 120 m, then the height of the kite is

Ans: $60\sqrt{3}$ m

8. A body is moved in straight line by constant power of machine. What will be the relation between the travelling distance (s) and time (t)?

Ans: $s^2 \propto t^3$

9. A simple wave motion is represented by $5\left(\sin 4\pi t + \sqrt{3}\cos 4\pi t\right)$. Its amplitude is

Ans: 10

10. For a given velocity, a projectile has the same range R for two angles of projection. If t_1 and t_2 are the time of flight in the two cases, then

Ans: $t_1 t_2 \propto R$

11. How much work must be done by a force on 50 kg body in order to accelerate it from rest to 20 m/s in 10 s?

Ans: 10^4 J

12. If at any time the displacement of simple pendulum is 0·02 m and acceleration is 2 m/s^2, then at this time angular velocity will be

Ans: 10 rad/s

13. The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be

Ans: $\frac{T}{2}$

14. The Hertz is a unit of

Ans: frequency

15. The relative permittivity of water is 81. If ε_0 and ε_w are permittivities of vacuum and water respectively, then

Ans: $\varepsilon_w = 81\varepsilon_0$

16. Two unequally charged balls attract each other with certain force. If they are allowed to touch and then separated to the same distance, the two balls will

Ans: repel with smaller force.

17. An electric field can deflect

Ans: α-particles

18. Two wires A and B of equal masses and of the same metal are taken. The diameter of the wire A is half the diameter of the wire B. If the resistance of the wire A is 24 Ω, then the resistance of wire B will be

Ans: 1·5 Ω

19. Choose the appropriate material to be used in the conductor of resistance boxes out of the following:

Ans: Manganin

20. If two bulbs of wattages 25 and 100 respectively each rated at 220 V are connected in series across 440 V supply, which bulb will fuse?

Ans: 25 W

21. Two equal resistors connected in series across a source of emf together dissipate 10 W of power. What will be the power dissipated if the same resistors are connected in parallel across the same source of emf?

Ans: Correct option has not been given. All will get marks even if not attempted.

22. Fuse wire is a wire of

Ans: high resistance and low melting point.

23. The maximum power delivered by a battery of emf ε and internal resistance r to an external circuit is

Ans: $\frac{\varepsilon^2}{4r}$

24. Kirchhoff's first law ($\sum i = 0$), where symbols have their usual meanings, is based on the law of conservation of

Ans: charge

25. An a.c. voltage of 50 V is applied to a series LCR circuit. If the voltage across resistor is 30 V and across the capacitor is 40 V, the voltage across inductor is

Ans: 80 V

26. A choke coil is a coil with a

Ans: high inductance and low resistance.

27. A resistance of 10Ω and a coil of 100 mH are connected across an a.c. source $v = 100 \sin 100t$. The maximum current in the coil is

Ans: $5\sqrt{2}$ A

28. The power factor of series LCR circuit at resonance is

Ans: 1·0

29. The power factor of a choke coil at a frequency of 50 Hz is 0·707. If the frequency is doubled, then value of power factor will be

Ans: $\frac{1}{\sqrt{5}}$

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30. The electric and magnetic field of an em-wave are

Ans: in phase and perpendicular to each other.

31. In vacuum, out of frequency, wavelength and amplitude, the speed of light depends upon

Ans: None of these

32. When light is refracted, _____ of light does not change.

Ans: frequency

33. The impurity atom with which pure silicon should be doped to make an *n*-type semiconductor is

Ans: Phosphorus

34. At absolute zero temperature, the element silicon acts as

Ans: insulator

35. A piece of copper and another of germanium are cooled from room temperature to 77 K. The resistance of

Ans: copper decreases and of germanium increases.

36. Zener breakdown in a semiconductor diode occurs when

Ans: reverse bias exceeds a certain value.

37. The reverse saturation current in a junction diode

Ans: increases with increase in temperature.

38. The input and output signals of CE amplifier are

Ans: differ in phase by 180º.

39. An electronic oscillator is nothing but an amplifier

Ans: with feedback

40. In a transistor, out of the base, collector and emitter, which is most lightly doped?

Ans: Base

41. NPN transistors are preferred to PNP transistors because they have

Ans: high mobility of electrons.

42. When NPN transistor is used as an amplifier

Ans: Correct option has not been given. All will get marks even if not attempted.

43. The Boolean expression $Y = \overline{A}B + A\overline{B}$ represents a/an

Ans: XOR gate

44. The numerical ratio of displacement to distance is

Ans: equal to or less than one.

45. The slope of displacement–time graph indicates

Ans: velocity of the body.

46. A particle is projected vertically upward. It attains a height h after 2 seconds and again after 10 seconds. The speed of the particle at height h is equal to (g denotes acceleration due to gravity)

Ans: $4g$

47. A body of mass 2 kg is placed on a horizontal surface having coefficient of kinetic friction 0·4 and coefficient of static friction 0·5. If a horizontal force of 2·5 N is applied on the body, the frictional force acting on the body will be

Ans: 2·5 N

48. If a body is moving in a circle of radius r meter with a constant speed v m/s, its angular velocity will be

Ans: $\frac{v}{r}$

49. The energy required to accelerate a car from speed of 10 m/s to 20 m/s is how many times than the energy required to accelerate the car from rest to speed of 10 m/s?

Ans: 3 times

50. A body of mass m moving with a constant velocity v hits another body of same mass moving with the same velocity but in the opposite direction and sticks to it. The velocity of the compound body after collision is

Ans: zero

51. The moment of inertia of a body does not depend upon

Ans: the angular velocity of the body.

52. The moment of momentum is called

Ans: angular momentum

53. Sky waves are reflected back to the earth's surface from the ionosphere due to the phenomenon of

Ans: total internal reflection

54. In communication system, repeaters are used to

Ans: increase the range of the system.

55. Sum of three terms of an A.P. is 33 and their product is 792. The least of them is

Ans: 4

56. The third term of a G.P. is 4. The product of the first five terms is

Ans: 4^5

57. The value of $2^{\log_3 5} - 5^{\log_3 2}$ is

Ans: 0

58. If $x^a = y$, $y^b = z$, $z^c = x$, then abc = ?

Ans: 1

59. A set contains n elements. The corresponding power set contains

Ans: 2^n elements

60. The points A(12, 8), B(–2, 6) and C(6, 0) are the vertices of

Ans: right angled triangle.

61. The centroid of a triangle is (2, 3) and two of its vertices are (5, 6) and (–1, 4). The third vertex of the triangle is

Ans: (2, –1)

62. The area of circle centred at (1, 2) and passing through (4, 6) is

Ans: 25 π

63. Centre of the circle $4x^2 + 4y^2 - 10x + 5y = 0$ is

Ans: $\left(\frac{5}{4}, -\frac{5}{8}\right)$

64. The value of $\sin^6\theta + \cos^6\theta + 3\sin^2\theta \cdot \cos^2\theta$ is

Ans: 1

65. If $y = \tan^{-1}\left(\frac{\cos x + \sin x}{\cos x - \sin x}\right)$, then $\frac{dy}{dx} = ?$

Ans: 1

66. If $y = \log_e x^x$, then $\frac{dy}{dx} = ?$

Ans: $\log_e(ex)$

67. $\int \frac{\log_e(\log_e x)}{x \log_e x}\, dx = ?$

Ans: $\frac{1}{2}\left[\log_e(\log_e x)\right]^2 + C$

68. Character enhancements in Word Processing does not include

Ans: Mail Merge

69. GUI is used as an interface between

Ans: hardware and user

70. Which document view gives an apperance as in the web browser?

Ans: Web layout view

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