PHYSICS QUESTION PAPER -1

1. Direction of current induced in a wire moving in a magnetic field is found using
   a. Fleming's left hand rule
   b. Fleming's right hand rule
   c. Ampere's rule
   d. Right hand clasp rule

2. The radius of $^{64}_{29}Cu$ nuclei in fermi is (given $R_0 = 1.2 \times 10^{-15}$ m)
   a. 4.8
   b. 1.2
   c. 7.7
   d. 9.6

3. The following truth table with A&B are input for ……………………….. gate

| A	B	Output
1	0	1
1	1	0
0	1	1
0	0	0

   a. AND
   b. OR
   c. XOR
   d. NOR

4. A point source of light is kept below the surface of water ($n_w = 4/3$) at a depth of $\sqrt{7}$ m. The radius of the circular bright patch of light noticed on the surface of water is _____ m
   a. $3/\sqrt{7}$
   b. 3
   c. $\sqrt{7}/3$
   d. $\sqrt{7}$

5. In this circuit the value of I_2 is
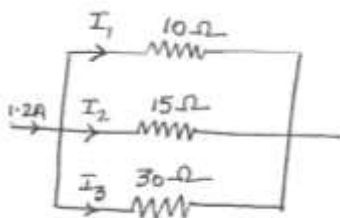
   a. 0.2 A
   b. 0.3 A
   c. 0.4 A
   d. 0.6 A

6. Spectrum of sunlight is an example for
   a. Band emission spectrum
   b. Line emission spectrum
   c. Continuous emission spectrum
   d. Continuous absorption spectrum

7. Two fixed charges A & B of 5 µC each are separated by a distance of 6m. C is the mid point of the line joining A & B. A charge 'Q' of -5 µC is shot perpendicular to the line joining A & B through C with a kinetic energy of 0.06J. The charge 'Q' comes to rest at a point D. The distance CD is
   a. 3 m
   b. $\sqrt{3}$ m
   c. $3\sqrt{3}$m
   d. 4 m

8. When an additional charge of 2 C is given to a capacitor, energy stored in it is increased by 21%. The original charge of the capacitor is
   a. 30 C
   b. 40 C
   c. 10 C
   d. 20 C

9. A current of 2 A flows in a system of conductors shown in figure. The potential difference $V_A - V_B$ will be
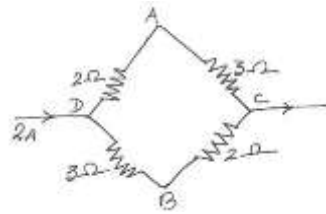
    a. 1 V   b. -1 V   b. -2 V   c. 2 V

10. In the diagram I_1, I_2 are the strength of the currents in the loop and straight conductor respectively. OA=OB=R. The net magnetic field at the center O is zero. Then the ratio of the currents in the loop and straight conductors is
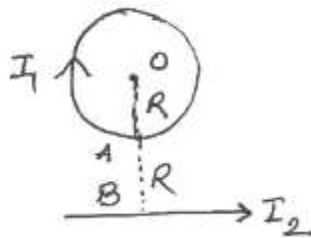
    a. π b. 2π c. $1/\pi$ d. $1/2\pi$

11. In R-L-C series circuit the potential differences across each element is 20V. Now value of the resistance alone is doubled , then potential difference across R, L and C respectively
    a. 20V, 10V, 10V   b. 20V, 20V, 20V   c. 20V, 40V, 40V   d. 10V, 20V, 20V

12. Pickout the correct statement from the following
    a. Mercury vapour lamp produces line emission spectrum
    b. Oil flame produces line emission spectrum
    c. Band spectrum helps us to study molecular structure
    d. Sunlight spectrum is an example for line absorption spectrum

13. Pick out the correct statement from the following
   1. Electron emission during β-decay is always accompanied by neutrino

2. Nuclear force is charge independent
3. Fusion is the chief source of stellar energy
   a. 1 & 2 are correct   b. 1 & 3 are correct   c. Only 1 is correct   d. 2 & 3 are correct
14. When the transistor is used as an amplifier
    a. Emitter-base junction must be reversed biased, collector-base junction must be forward biased
    b. Emitter-base junction must be forward biased, collector-base junction must be forward biased
    c. Emitter-base junction must be reversed biased, collector-base junction must be reverse biased
    d. Emitter-base junction must be forward biased, collector-base junction must be reverse biased
15. Which of the following is not made my quarks
    a. Neutron   b. Positron   c. Proton   d. π-meson
16. The output of an OR gate is connected to both the inputs of a NAND gate. The combination will serve as
    a. AND gate   b. NOT gate   c. NAND gate   d. NOR gate
17. A projectile is projected at 10 m/s by making an angle of 60^0 to the horizontal. After some time its velocity makes an angle of 30^0 to the horizontal. The speed at this instant is
    a. $10/\sqrt{3}$ b. $10\sqrt{3}$ c. $5/\sqrt{3}$ d. $5\sqrt{3}$
18. Pick out the wrong statement form the following
    a. Lateral shift increases as the angle of incidence increases
    b. Lateral shift increases as the value of refractive index increases
    c. Normal shift decreases as the value of refractive index increases
    d. Both normal shift lateral shift are directly proportional to the thickness of the medium
19. A small oil drop of mass 10^{-6} kg is hanging in at rest between two plates separated by 1 mm having a potential difference of 500 V. The charge on the drop is _____ (g=10 m/s^2)
    a. $2x10^{-9}$ C   b. $2x10^{-11}$ C   c. $2x10^{-6}$ C   d. $2x10^{-8}$ C
20. A solenoid has length 0.4 cm, radius 1 cm and 400 turns of wire. If a current of 5A is passed through this solenoid, what is the magnetic field inside the solenoid?
    a. $6.28x10^{-1}$ T   b. $6.28x10^{-4}$ T   c. $6.28x10^{-6}$ T   d. $6.28x10^{-3}$ T
21. What is the value of shunt resistance required to convert a galvanometer of resistance 100 Ω in to an ammeter of range 1A? Given: Full scale deflection of the galvanometer is 5 mA
    a. 0.5 Ω b. 5/9.95 Ω c. 0.05 Ω d. 9.95/5 Ω
22. A circular coil of radius 10 cm and 100 turns carries a current 1A. What is the magnetic moment of the coil?
    a. 3.142 Am^2 b. 3.142x10^4 Am^2 c. 3 Am^2 d. 10^4 Am^2
23. A step down transformer has 50 turns on the secondary and 100 turns on the primary winding. If a transformer is connected 220 V 1A A.C. source. What is the output current of the transformer?
    a. 100 A   b. 1/20 A   c. 2 A   d. 20 A
24. A period of the geostationary satellite is
    a. 30 h   b. 24 h   c. 48 h   d. 12 h
25. In anomalous expansion of water, at what temperature, the density of water is maximum

a. >4 °C   b. 4 °C   c. 10 °C   d. <4 °C
26. A focal length of a lens is 10 cm. What is the power of the lens in dioptre?
       a. 15 D   b. 0.1 D   c. 20 D   d. 10 D
27. The maximum kinetic energy of the photoelectrons depends only on
       a. Incident angle   b. potential   c. pressure   d. frequency
28. A force between two protons is same as the force between proton and neutron. The nature of the force is
       a. Electrical force b. weak nuclear force   c. gravitational force   d. strong nuclear force
29. A carbon film resistor has colour code GREEN BLACK VIOLET GOLD. The value of the resistor is
       a. $500\pm5\%$ MΩ b. 50 MΩ c. $500\pm10\%$ MΩ d. 500 MΩ
30. A proton beam enters a magntetic field of 10^{-4} Wb/m^2 normally. If the specific charge of the proton is 10^{11} C/Kg and its velocity is 10^9 m/s, then the radius of the circle described will be
       a. 10 m   b. 1 m   c. 0.1 m   d. 100 m
31. The resistance of the bulb filament is 100 Ω at a temperature of 100 °C. If its temperature coefficient of resistance be 0.005 /°C, its resistance will become 200 Ω at a temperature of
       a. 400 °C   b. 200 °C   c. 300 °C   d. 500 °C
32. Calculate the focal length of a reading glass of a person if the distance of distinct vision is 75cm
       a. 37.5 cm   b. 100.4 cm   c. 25.6 cm   d. 75.2 cm
33. The polarizing angle of glass is 57^0. A ray of light which is incident at this angle will have an angle of refraction at
       a. 33^0 b. 38^0 c. 25^0 d. 43^0
34. What is the wavelength of light for least energetic photon emitted in the Lyman series of the hydrogen spectrum (Take hc=1240 eV nm)
       a. 102 nm   b. 150 nm   c. 82 nm   d. 122 nm
35. The angle between the dipole moment and electric field at any point on the equatorial plane is
       a. 90^0 b. 45^0 c. 0^0 d. 180^0
36. On the circuit shown below, the ammeter and the voltmeter readings are 3A and 6A respectively. Then the value of the resistance is

       a. >2Ω b. ≥2Ω c. 2Ω d. <2Ω
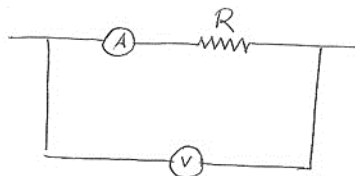
37. In the circuit shown, the current in the 1 Ω resistor is
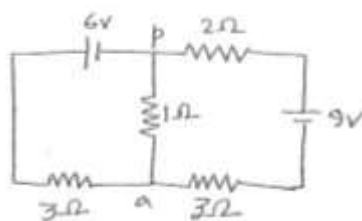
a. 0.13 A from a to p   b. 0.13 A from p to a   c. 0.3 A from p to a   d. 0 A

38. On a hot summer night, the refractive index of air is smallest near the ground and increases with height from the ground when a light beam is directed horizontally, the Huygen's principle leads us to conclude that as it travels, the light beam
    a. bends downwards   b .bends upwards   c. becomes narrower
    d. goes horizontally without any deflection

39. A ball is projected from the ground at angle θ with the horizontal. After 1 s it is moving at an angle of 45^0 with the horizontal and after 2 s it is moving horizontally. What is the velocity of projectile of the ball? (take g=10m/s²)
    a. $10\sqrt{3}$ m/s   b. $20\sqrt{3}$ m/s   c. $10\sqrt{5}$ m/s   d. $20\sqrt{2}$ m/s

40. The component of vector $\vec{A} = a_x\hat{\imath} + a_y\hat{\jmath} + a_z\hat{k}$ along the direction of $\hat{\imath}\text{-}\hat{\jmath}$ is
    a. a_x-a_y+a_z b. a_x-a_y c. a_x-a_y/$\sqrt{2}$ d. a_x+a_y+a_z

41. Let $\vec{V}$, V_{rms},and V_p respectively denote the mean speed, root mean square speed and most probable speed of the molecules in an ideal monoatomic gas at absolute temperature T. The mass of the molecule is m. Then
    a. No molecule can have an energy greater than $\sqrt{2}V_{rms}$
    b. No molecula can have speed less than $V_p/\sqrt{2}$
    c. $V_p < \vec{V} < V_{rms}$
    d. The average kinetic energy of a molecule is ¾ mV_p^2

42. The electron in a hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are the principal quantum number of two states. Assume the Bohr model to be valid. The time period of the electron in the intial state is eight times that in the final state. The possible values of n_1 and n_2 are:
    a. n_1=4, n_2=2   b. n_1=8, n_2=2   c. n_1=4, n_2=1   d. n_1=6, n_2=3

43. Two particles, each of mass m and charge q are attached to the two ends of a light rigid rod of length 2R. The rod is rotated at constant angular speed about a perpendicular axis passing through its centre. The ratio of the magnitudes of the magnetic moment of the system and its angular momentum about the centre of the rod is
    a. q/2m   b. q/m   c. 2q/m   d. q/πm

44. A charge +q is fixed at each of the points X=X_0, X=$3X_0$, X=$5X_0$…… on the x-axis and a charge -q is fixed at each of the points X=$2X_0$, X=$4X_0$, X=$6X_0$…… Here X_0 is a positive constant. Take the electric potential at a point due to a charge Q at a distance r from it to be $Q/4\pi\varepsilon_0$. Then the potential at the origin due to the above system of charges is:
    a. 0   b. $q/(8\pi\varepsilon_0 X_0 ln2)$ c. ∞   d. $q\,ln(2)/(4\pi\varepsilon_0 X_0)$

45. Two cylinders A and B fitted with pistons contain equal amount of an ideal diatomic gas at 300 K. The piston of A is free to move, while that of B is held fixed. The same amount of heat is given to the gas in each cylinder. If the rise in temperature of the gas in A is 30 K, then the rise in temperature of the gas in B is
    a. 30 K   b. 18 K   c. 50 K   d. 42 K

46. Two very long straight parallel wire carry steady currents I and –I respectively. The distance between the wire is l. At a certain instant of time a point charge q is at a point equidistant from

the two wire in the plane of the wire. Its instantaneous velocity V is perpendicular to this plane. The magnitude of the force due to the magnetic field acting on the charge at this instant is

    a. $\mu_0 IqV/2\pi d$ b. $\mu_0 IqV/\pi d$ c. $2\mu_0 IqV/\pi d$ d. 0

47. A closed compartment containing gas is moving with some acceleration in horizontal direction. Neglect effect of gravity. Then the pressure in the compartment is

    a. Same everywhere   b. lower in front side   c. lower in rear side

    d. lower in upper side

48. In 1 s a particle goes from point A to point B, moving in a semicircle (see figure). The magnitude of the average velocity is

    a. 3.14 m/s   b. 2.0 m/s   c. 1.0 m/s   d. zero

49. Two identical circular loops of metal wire are lying on a table without touching each other. Loop A carries a current which increases with time. In response, the loop B:

    a. Remains stationary   b. is attracted by the loop A   c. is repelled by the loop A

    d. rotates about its CM with CM fixed

50. A thin slice is cut of a glass cylinder along a plane parallel to its axis. The sliceis placed on a flat plate as shown. The observed interference from this combination shall be:

    a. Straight   b. circular

    c. equally spaced   d. having fringe spacing which increases as we go onwards

51. A uniform but time varying magnetic field B(t) exists in a circular region of radius a and is directed into the plane of the paper as shown. The magnitude of the induced electric field at point P at a distance r from the centre of the circular   region
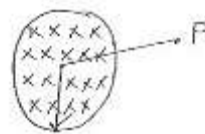
a. Is zero   b. decreases as 1/r

c. increases as r   d. decreases as 1/r²

52. A monoatomic ideal gas initially at temperature T_1 is enclosed in a cylinder fitted with a frictionless piston. The gas is allowed expand adiabatically to a temperature T_2 by releasing the piston suddenly. If L_1 and L_2 are the lengths of the gas column before and after expansion respectively, then T_1/T_2 is given by
    a. $(L_1/L_2)^{2/3}$ b. (L_1/L_2) c. (L_2/L_1) d. $(L_2/L_1)^{2/3}$

53. A block of ice at -10 °C is slowly heated and converted into steam at 100 °C. Which of the following curves represents the phenomena qualitatively

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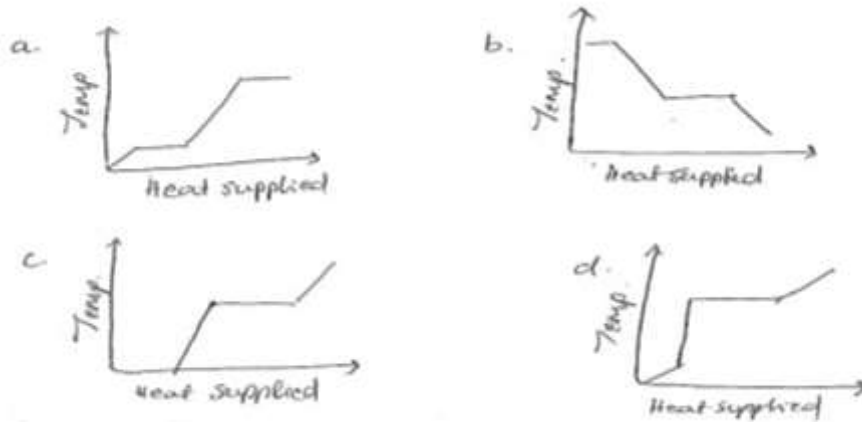
54. In the given process of an ideal gas, dW=0 and dQ=0. Then for the gas
    a. The temperature will decrease   b. the volume will decrease
    c. the pressure will remain constant   d. the temperature will increase

55. Two beam of light having intensities I and 4I interfere to produce a fringe pattern on a screen. The phase difference between the beams is $\pi/2$ at point A and π at point B. Then the difference between the resultant intensities at A and B is
    a. 2I   b. 4I   c. 5I   d. 7I

56. A quantity X is given by $\varepsilon_0 L(\Delta v/\Delta t)$ where ε_0 is the permittivity of free space, L is the length, Δv is a potential difference and Δt is a time interval. The dimensional formula for X is the same as that of
    a. Resistance   b. charge   c. voltage   d. current

57. A simple pendulum has a time period T_1, when on the earth's surface and T_2 when taken to a height R above the earth's surface where R is the radius of the earth. The value of T_2/T_1 is
   a. 1   b. $\sqrt{2}$ c. 4   d. 2

58. P-V plots for two gases during adiabatic process are shown on the figure. Plots 1 and 2 should correspond respectively to
    a. He & O_2 b. He & Ar   c. O_2 & He   d. O_2 & N_2

59. The pulleys and strings shown in the figure are smooth and of negligible mass. For the system to remain in equilibrium, the angle θ should be

a. 0^0 b. 30^0 c. 45^0 d. 60^0

60. Two circular coils can be arranged in any of the three situations shown in the figure. Their mutual inductance will be
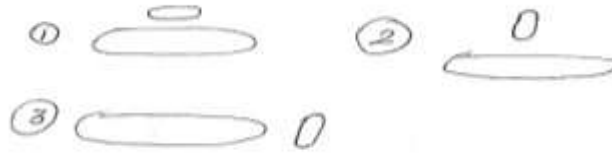
a. Maximum in situation (1)   b. Maximum in situation (2)
c. Maximum in situation (3)   d. the same in all situations

Physics -1 - Brown –Answers:

1	b	31	a
2	a	32	a
3	c	33	a
4	b	34	d
5	c	35	d
6	b	36	d
7	d	37	a
8	d	38	b
9	a	39	c
10	d	40	c
11	a	41	c, d
12	a, c, d	42	a, d
13	d	43	a
14	d	44	d
15	b	45	d
16	d	46	d
17	a	47	b
18	c	48	b
19	b	49	c
20	a	50	a
21	b	51	b
22	a	52	d
23	d	53	a
24	b	54	a
25	b	55	b
26	d	56	d
27	d	57	d
28	d	58	b
29	a	59	c
30	d	60	a