Physics

1. The dimensional formula for permittivity of free space ( ) in the equation

 Where the symbols have their usual meanings, is

1. [M1L3A-2T-4]
2. [M-1L-3A2T4]
3. [M-1L-3A-2T-4]
4. [M1L3A-4T2]
5. The unit of impulse is same as that of
6. Linear momentum
7. Angular momentum
8. Moment of Inertia
9. Force + time
10. A drunkard walking in a narrow lane takes 5 steps forward and 3 steps backward followed again by 5 steps forward and 3 steps backward and so on. Each step is 1m long and requires 1s. The time the drunkard takes to fall in a pit 13m away is
11. 13s
12. 32s
13. 37s
14. 49s
15. A motorboat is racing towards north at 25kmph and the water current in that region is 10kmph in the direction of 600 east of south. The resultant speed of the boat is
16. 22kmph
17. 31kmph
18. 34kmph
19. 41kmph
20. A flywheel gains a speed of 540 rpm in 6 seconds. Its angular acceleration is
21. 3π rad/s2
22. 6π rad/s2
23. 9π rad/s2
24. 12π rad/s2
25. If the earth were to stop rotating, the value of the acceleration due to gravity at Delhi
26. Increases
27. Decreases
28. Is unchanged
29. Becomes zero
30. A steel wire of length 4.7m and cross-sectional area 3.0 x 10-5 m2 stretches by the same amount as a copper wire of length 3.5m and cross sectional area 4.0 x 10-5 m2 under a given load. The ratio of Young’s modulus of steel to that of copper is
31. 1.2
32. 1.4
33. 1.6
34. 1.8
35. If it takes 5 minutes to fill a 15 litre bucket from a water tap of diameter cm then the Reynolds number for the flow is (density of water 1000kg/m3 and viscosity of water is 10-3 Pa. s) close to
36. 5500
37. 11,000
38. 550
39. 1100
40. When heat is given to a gas in an isothermal change, the result will be
41. External work done
42. Rise in temperature
43. Increase in internal energy
44. External work done and also rise in temperature
45. Zener diode is used for
46. Amplification
47. Producing oscillations
48. Stabilisation
49. Rectification
50. A vertical pillar of soft iron partially embedded in earth in the northern hemisphere is found to be magnetised by the earth’s magnetic field. The polarity at the top end of the pillar will be
51. South pole
52. North pole
53. Will change from south to north according to the time of the day
54. None of the above.
55. The energy stored in an inductance is 1 joule when a current of 0.1 ampere is established in it. The self-inductance of the coil is
56. 200 H
57. 50 H
58. 25 H
59. 2.59 H
60. If a current of 2A gives rise to a magnetic flux of 3x10-5 m2 Wb through a coil 100 turns, then the magnetic energy stored in the medium surrounding the coil is
61. 5 J
62. 5x10-7 J
63. 5x10-3 J
64. 0.5 J
65. The magnetic flux through a coil varies with time as. The ratio of emf at t=3s to t=0s will be
66. 1:9
67. 1:6
68. 6:1
69. 9:1
70. In a magnetic hysteresis loop, the value of B, when H=0 is called
71. Retentively
72. Coercivity
73. Susceptibility
74. Permeability
75. The magnetic field of a given length of wire for single turn coil, at its centre is B. Then its value for two turns coil for the same wire
76. B/4
77. B/2
78. 4B
79. 2B
80. The current sensitivity of a galvanometer is
81. NA/K.B
82. NAB/K
83. AB/K.N
84. NK/A.B
85. The magnetic moment of a current (I)carrying circular coil of radius (R) and number of turns (n) varies as
86. 1/R2
87. 1/R
88. R
89. R2
90. A boy can throw a stone up to a maximum height of 10m. the maximum horizontal distance that the boy can throw the same stone upto will be
91. 10 m
92. 10m
93. 20m
94. 20m
95. A batsman hit back a ball straight in the direction of the bowler without changing its initial speed of 12m/s. if the mass of the ball is 0.15kg. the impulse imparted to the ball is
96. 2.8 Ns
97. 3.6 Ns
98. 3.9 Ns
99. 4.2 Ns
100. The number of significant figures in the numbers 4.8000 x 104 and 48000.50 are respectively
101. 5 and 6
102. 5 and 7
103. 2 and 7
104. 2 and 6
105. Identify the incorrect statement
106. Charge given to a conductor gets distributed on its surface
107. Charge given to an insulator is localised
108. A negatively charged body loses mass
109. A positively charged body loses mass
110. Two equal and opposite charges of masses m1  and m2 are accelerated in an uniform electric field through the same distance. What is the ratio of their accelerations if their ratio of masses is ?

a)

b) 

c) 

d) 

1. A parallel plate capacitor is made of two circular plates separated by a distance of 5mm and with a dielectric constant 2.2 between them. When the electric field in the dielectric is 3 x 104 V/m, the charge density of the positive plate will be close to
2. 3 x 104 C/m2
3. 6 x 104 C/m2
4. 3 x 10-7 C/m2
5. 3 x 10-7 C/m2
6. An electric dipole is placed at an angle of 300 to a non-uniform electric field. The dipole will experience
   1. A translational force only in a direction normal to the direction of the field
   2. A torque as well as a translational force
   3. A torque only
   4. A translational force only in the direction of the field
7. A 12cm wire is given a shape of a right angled triangle ABC having sides 3cm, 4cm, and 5cm as shown in the figure. The resistance between two ends (AB, BC, CA) of the respective sides are measured one by one by a millimetre. The resistances will be in the ratio:
   1. 27:32:35
   2. 21:24:25
   3. 3:4:5
   4. 9:16:25
8. An electric kettle takes 4A current at 220V. How much time will it take to boil 1 kg of water from temperature 200C? The temperature of the boiling water is1000C. (Specific heat capacity of water, c=4200J/kg/K.)
   1. 4.2 min
   2. 6.3 min
   3. 8.4 min
   4. 12.6 min
9. A strip of copper and another germanium are cooled from room temperature to 80K.

The resistance of

* 1. each of these decreases
  2. copper strip increases and that of germanium decreases
  3. copper strip decreases and that of germanium increases
  4. each of these increases

1. A circular coil carrying a certain current produces a magnetic field B0 at its centre. The coil is now rewound so as to have three turns and the same current is passed through it. The new magnetic field at the centre is
   1. B0/9
   2. 9B0
   3. B0/3
   4. 3B0
2. The magnetic field due to a current carrying circular loop of radius 3cm at a point on the axis at a distance of 4cm from the centre is 54μT. What will be its value at the centre of the loop?
   1. 125 μT
   2. 150 μT
   3. 250 μT
   4. 75 μT
3. In an ammeter 10% of main current is passing through the galvanometer. If the resistance of galvanometer is G, the shunt resistance in ohms is
   1. 90 G
   2. G/90
   3. 9G
   4. G/9
4. To get three images of a single object placed symmetrically, one should have two plane mirrors at an angle of
   1. 600
   2. 900
   3. 1200
   4. 300
5. In a spherical glass body of radius 10cm and refractive index 1.5 is silvered on its curved surface. A small air bubble is 6cm below the flat surface inside it along the axis. The position of the image of the air bubble made by the mirror is seen:
   1. 20 cm below the flat surface
   2. 30 cm below the flat surface
   3. 16 cm below the flat surface
   4. 14 cm below the flat surface
6. An equilateral glass prism of refractive index 1.6 is kept fully immersed in water of refractive index 4/3, for a certain ray of monochromatic light. What is the closest value for the angle of minimum deviation of the light ray in this setup?
   1. 100
   2. 140
   3. 180
   4. 220
7. According to newton’s corpuscular theory the speed of light is
   1. Same in all the media
   2. Lesser in rarer medium
   3. Lesser in denser medium
   4. Independent of the medium
8. In Young’s experiment for interference of light the slits 0.2cm apart are illuminated by yellow light (λ=589.6nm). the fringe width on the screen placed 1m from the plane of the slits, when the whole system is immersed in water(μ=4/3) is,
   1. 0.11 mm
   2. 0.22mm
   3. 0.33mm
   4. 0.44mm
9. A change of 8mA in the emitter current brings a change of 7.6mA in the collector current. The value of β is
   1. 16
   2. 17
   3. 18
   4. 19
10. Identify the logic gate from the following truth table

|  |  |  |
| --- | --- | --- |
| A | B | Y |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

1. AND
2. OR
3. NAND
4. XOR
5. In a series LCR circuit, the resonant frequency depends on
   1.  b) 

c)

* 1. 

1. An electron and a proton enter a magnetic field perpendicularly. Both have same kinetic energy. Which of the following is true?
   1. Trajectory of proton is less curved
   2. Trajectory of electron is less curved
   3. Both trajectories are equally curved
   4. Both move along a straight line
2. When a 2.5kg crown is immersed in water, it has an apparent weight of 22N. What is the density of the crown?

a) 8.3x103 kgm-3

b)0.3x103 kgm-3

c)5.4x103 kgm-3

d)7.2x103 kgm-3

1. In the Bohr model an electron moves in a circular orbit around the proton. Considering the orbiting electron to be a circular current loop, the magnetic moment of the hydrogen atom, when the electron is in nth excited state is:
   1. 
   2. 
   3. 
   4. 
2. The activity of a radioactive element decreased to one third of the original activity A0 in a period of 9 years. What will be the activity after a lapse of 9 years?
   1. A0/9
   2. 9A0
   3. A0/3
   4. 3A0
3. The process of superimposing message signal on high frequency carrier wave is called
   1. Amplification
   2. Demodulation
   3. Transmission
   4. Modulation
4. Match List-***I*** (electromagnetic wave type) with List-***II*** (its application) and select the correct option from the choices given below the lists:

|  |  |
| --- | --- |
| List-***I*** | List-***II*** |
| 1. Infrared waves | 1. To treat muscular strain |
| 1. Radio waves | 1. For broadcasting |
| 1. X-rays | 1. To detect fracture of bones |
| 1. Ultraviolet rays | 1. Absorbed by the ozone layer of the atmosphere |

1 2 3 4

1. (iv) (iii) (ii) (i)
2. (i) (ii) (iv) (iii)
3. (iii) (ii) (i) (iv)
4. (i) (ii) (iii) (iv)
5. **Statement-1**: an open tube having fundamental frequency f generates the same frequency when half immersed in a dense liquid.

**Statement-2**: on immersing the tube in a liquid, the open tube behaves as a closed pipe.

* 1. Statement-1 is false, Statement-2 is true
  2. Statement-1 is true, Statement-2 is true; statement-2 is a correct explanation for statement-1.
  3. Statement-1 is true, Statement-2 is true; statement-2 is not a correct explanation for statement-1
  4. Statement-1 is true, Statement-2 is false.

1. In a potentiometer arrangement, a cell 1.25 V gives a balance point at 35cm length of the wire. If the cell is replaced by another cell and the balance point shifts to 63cm. the emf of the second cell is
   1. 1.75V
   2. 2V
   3. 2.25V
   4. 2.5V
2. Calculate the temperature at which rms velocity of SO2 molecules is the same as that of O2 molecules at 270C. Molecular weights of Oxygen and Sulphur dioxide are 32 and 64 respectively

a) 3270C

b) 1270C

c) 3180C

d) 4100

1. A particle is projected with a velocity u making an angle ϴ with the horizontal. The instantaneous power of the gravitational force-
   1. Varies linealy with time
   2. Is contant throughout
   3. Is negative for complete path
   4. Varies inversely with time.
2. A carbon resistor of 74 kΩ is to be marked with rings of different colours for its identification. The sequence of colours are
   1. Violet Yellow Orange
   2. Grey Green Yellow
   3. Yellow Violet Red Gold
   4. Green Gray Orange Silver