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GRADE 13

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02 Hours

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**fojk jdr mÍCIKh - 2019**

**Second Term Examination - 2019**

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**PHYSICS – I**

Answer all questions.

**g = 10 Nkg-1**

01. The dimensional formula of Latent heat is,

1. ML2 T -2 2. Mo L2 T-2 3. ML3 T-2 4. M2 L2 T-2 5. Mo Lo T-2

02. Micrometer screw gauge gives a regarding of 1.24 mm as the thickness of thin metal sheet. Reading for the stack of three such metal sheets is 3.78 mm. The magnitude of zero error of the equipment is,

1. 0.05 mm 2. 0.04 mm 3. 0.03 mm 4. 0.02 mm 5. 0.01 mm

03. Which one of the following statements is true for electromagnetic waves but not for other transverse waves?

1. They obey the principle of conservation of energy.

2. They obey the principle of superposition.

3. They travel at a finite speed.

4. They travel in a vaccum.

5. They can be reflected.

04. A box is dropped at time t = 0 vertically on to a conveyor belt moving at a constant speed in horizontal direction. If a box attains the velocity of belt at time t0 which of the following curves

best represent the variation of the magnitude frictional force (F) exerted on the box by the belt

with time (t)

F

t0

t

F

t

t0

F

t

t0

1. 2. 3.

F

t0

t

F

t0

t

4. 5.

05. A ball thrown from the top of a tower in vertically upward direction. Velocity at point h below

the point of projection is twice of the velocity at a point h above the point of projection. The maximum height attained by the ball above the top of the tower is,

1. h 2. 2h 3. 4. 5.

06. Three current carrying conductors of the same length P, Q and R are placed in parallel as shown. Seperation between P and Q is 20 mm and that of Q and R is 30 mm. What must the strength of current and direction in wire R so that Q will stay in equilibrium between other two

fixed conductors in the position shown?

P

48

Q

I1

R

1. 2A upwards

2. 2A downwards

3. 6A upwards

4. 6A downwards

5. 8A upwards

07. A 12 V, 24 W tungsten filament bulb is supplied the current from n number of cells connected

in series. Each cell has an e.m.f. 1.5 V and internal resistance of 0.25 . The value of n in order that bulb runs at its rated power is

1. 4 2. 6 3. 8 4. 10 5. 12

08. Three particles A, B and C are projected from the same initial speed, making angles 30o, 45o and 60o respectively with horizontal. Which of the following statements is correct?

1. A, B and C have unequal ranges.

2. Ranges of A and C are equal and less than that of B.

3. Ranges of A and C are equal and greater than that of B.

4. Ranges of B and C are equal and greater than that of A.

5. Ranges of A and B are equal and less than that of C.

09. In the figure, the ball A is released from rest, when the spring is at its natural length. For the block B of mass M to leave contact with ground at some stage, the minimum mass opf A must

be,

M

A

B

1. 3 M 2. 2 M

3. M 4.

5.

10. The distances from sun to Neptune and Saturn is approximately 1014 m and 1012 m.If these are orbiting in circular paths, the ratio of time periods of them is,

1. 10 2. 100 3. 100 4. 10 5. 1000

11. A large vessel of water is place inside a closed room having a relative humidity of 50%. If the temperature remains constant, as time goes on,

A - Absolute humidity inside the room will increase continuously.

B - Relative humidity inside the room stays constant.

C - The dew point of the room becomes equal to the room becomes equal to the room

temperature.

Of the above statements,

1. Only (B) is true 2. Only (C) is true

3. Only (A) and (B) are true 4. Only (B) and (C) are true

5. All (A) , (B) and (C) are true

12. In a milikan type experiment there are two oil droplets P and Q between the charged plates, as shown in the diagram, Droplet P is at rest, while Q is moving upwards.

+ + + + + +

\_ \_ \_ \_ \_ \_

**P**

**Q**

The polarity on the charge on P and Q is,

**P Q**

1. + +

2. neutral -

3. - -

4. - +

5. + -

13. Two monoatomic ideal gases A and B of molecular masses MA and MB are respectively are enclosed in separate containers kept at the same temperature. The ratio of speed of sound in gas A to that in B is,

1. 2. 3.

4. 5.

14. A block of mass m is released from a height h1 along smooth track as shown in the figure.

h1

r1

B

A

The force exerted by the track at point B, where radius of curvature r1 is,

1. 2 mg + 2. mg + 3. +

4. mg + 5. +

15. A negatively charged particle in a uniform magnetic field B moves in a circular path of radius

r as shown below.

x x x x x

x x x x x

x x x x x

x x x x x

x x x x x

x x x x x

r

Which of the following graphs best represent how the frequency of revolution (f) of the particle depends on the radius r?

f

r

f

r

f

r

1. 2. 3.

f

r

f

r

4. 5.

16. A metallic spherical shell of radius R has a charge - Q distributed uniformly on it. A point charge + Q is placed at the centre of the shell. Which graph represents the variation of electric

E

r

O

R

E

O

R

r

field E with distance r from the centre of the shell?

E

O

R

r

1. 2. 3.

E

r

O

R

E

r

O

R

4. 5.

17. What is the steady state current in the 2 resistor shown in the figure? The internal resistance

of the battery is negligible.

A

B

2

3

5

0.5F

6V

2.8

1. 2.1 A

2. 1.8 A

3. 1.5 A

4. 1.2 A

5. 0.9 A

18. Figure shows a metal ring whose below half has area four times as upper half. Total current flowing through the ring is 10 A. What is the magnetic flux density at the centre of ring?

10A

10A

1. 2. 3.

4. 5.

19. The figure shows a network of 8 resistors. The equivalent resistance between A and B is,

8

4

8

14

36

23

12

2

A

B

1. 90 2. 60

3. 45 4. 30

5. 15

20. A horizontal pipe line carries water in a stramline flow. At a point along the pipe where the cross-sectional area is 10 cm2, the water velocity is 1 ms-1 and pressure is 2000 Pa. The pressure of water where the cross-sectional are a 5 cm2 is,

density of water = 1000 kgm-3

1. 500 Pa 2. 1000 Pa 3. 1500 Pa

4. 2000 Pa 5. 2500 Pa

21. Two tuning forks with natural frequencies of 340 Hz each move relative to a stationary observer. One fork moves with a velocity U away from the observer while other moves towards

him at the same velocity U. The speed of sound is 340 ms-1. If the observe hears beats of frequency 3 Hz, the value of U is ,

1. 7.5 ms-1 2. 6.0 ms-1 3. 4.5 ms-1

4. 3.0 ms-1 5. 1.5 ms-1

22. Two capacitors of capacitance C and 2C are charged to potential difference V and 2V respectively. If two positive plates are connected together and the two negative plates connected together, then this system of capacitors,

1. Gains charge, but loses energy.

2. Gains energy, but loses charge.

3. Loses both energy and charge.

4. Loses energy, but charge remains constant.

5. Loses charge, but energy remains constant.

23. A single circular loop of wire in the plane of the page is perpendicular to a uniform magnetic field B directed out of paper, as shown in the figure. If the magnitude of magnetic field is decreasing, then the induced current in the wire is,

1. Directed upward out of the paper.

2. Directed downward out into the paper.

3. Clockwise around the loop

4. Counter-clockwise around the loop

5. No current is induced.

24. Figure shows a charged oil drop of mass m, which is stationary in the electric field between two parallel plates. If the potential difference between the plates is V and the separation of plates is d, the charge on the oil drop is,

1. - 2.

O

+V

d

Oil drop

3. - mgVd 4.

5.

25. The block of mass M is moving on the frictionless horizontal surface, collides with the spring

of spring constant k and compressed by length L. The maximum momentum of the block after

the collision is,

M

1. 2.

3. Zero 4. L

5.

26. An unchanged capacitor of fixed capacitance is connected in series with a switch and battery. The switch is closed at time t=0. Which of the following graphs show the energy, E stored by

the capacitor, changes with time t, after the switch is closed?

E

t

O

E

t

O

E

t

1. 2. 3.

E

t

E

t

4. 5.

27. A metal cube of coefficient of linear expansion is floating in a beaker containing a liquid of

coefficient of volume . When the temperature is raised by T, the depth upto which the cube is submerged in the liquid remains unchanged. If the expansion of the beaker is ignored, the relationship between and

1. = 2. = 3. =

4. = 2 5. = 3

28. A stone of density hangs from the free end of a sonometer wire. The fundamental frequency of vibration of wire is f. If the stone hangs wholly immersed in a liquid of density , the fundamental frequency will become.

1. f 2. f 3. f

4. f 5. f

29. A parallel plate capacitor is filled with two dielectric as shown in the figure. Area of each plate is A and the separation is d. The dielectric constants are k1 and k2 respectively. The capacitance between A and B will be,

d

A

B

k1

k2

1. (k1 + k2) 2. (k1 + k2)

3. (2k1 + k2) 4. (k1 + k2)

5. (k1 + 2k2)

30. A circuit is arranged as shown in the diagram. The battery has no internal resistance. If the reading on the voltmeter is 4V, What will the reading on ammeter be?

A

V

12V

R

1. 1 A

2. 2 A

4

4

4

4

4

4

4

4

4

4

4

4

4

4

3. 3 A

4. 4 A

5. 5 A

31. Which of the following combination of resistors would dissipate 24W when connected to 12V

battery?

4

4

4

4

4

4

1. 2. 3.

4

4

4. 5.

4

4

4

4

4

4

32. On a certain day it was found that the velocity of sound in air was less near the sea level than at higher altitude. Consider reasons given below in order to explain above observation.

(A) - More water vapour being present in air at the sea level.

(B) - Atmospheric pressure being higher at the sea level.

(C) - The temperature of air being lower at the sea level.

Of above explainations,

1. Only (A) is true. 2. Only (B) is true.

3. Only (C) is true. 4. Only (A) and (B) are true.

5. All (A), (B) and (C) are true.

33. A particle is perfoming simple harmonic motion consider following statements.

(A) - When the displacement of particle is maximum acceleration aslo maximum.

(B) - When velocity is maximum displacement is zero.

(C) - Acceleration is directly propotional to displacement.

Which of the above statements are true?

1. A 2. B 3. C

4. A,B 5. A,B,C

34. Four charges of +2C A,B,C and D are placed on the points on circumference as shown in the diagram.

A

+ 2 C

+ 2 C

D

+ 2 C

C

+ 2 C

B

o

Consider following statements.

(A) - Force on B is towards B to D

(B) - To take +5C from D to C, work should done by us.

(C) - Electric field intensity at the center is zero. But there is electric potential.

Of above statements.

1. Only (A) and (B) are true 2. Only (B) and (C) are true

3. Only (A) and (C) are true 4. Only (C) is true

5. All (A), (B) and (C) are true

35. A light weight round object is covered with a graphite layer and has been charged positively. It hangs from a string between two parallel charged plates as shown in the diagram. The mass

of the object is M and the charge is q. The electric field intensity between plates is E. The tension in the string is,

E

1. Eq - mg 2. mg + 2Eq

3. mg + Ed 4. mg - Eq

5. mg

36. Three rods made of the same material and having the same cross-section have been joined as shown in the figure.

0o C

90o C

90o C

Each rod is of the same length. The left and right ends are kept at 0oC and 90oC respectively. The temperature of the junction of three rods will be,

1. 60oC 2. 45oC 3. 30oC

4. 15oC 5. 0oC

37. Two identical bulbs L1 and L2 are switched in parallel with a 12V battery.

x

x

L1

L2

12V

Which one of the following graph is correct for the potential difference V and the powder P of L1 bulb?

V

P

O

O

P

V

O

V

P

1. 2. 3.

O

V

P

O

V

P

4. 5.

38. The masses and radii of the earth and moon are M1, R1 and M2, R2 respectively. Their centers

are a distance d apart. The minimum speed with which a particle of mass M should be projected from a mid way between two centers so as to escape to infinity is given by, G- Gravitational constant.

1. 2 2. 2 3. 2

4. 2 5.

39. Three identical bulbs are connected as shown in the circuit diagram below. What will happen to the readings on ammeter and voltmeter when switch is closed?

**Ammeter** **Voltmeter**

V

A

E, r

X

S

X

X

1. Increase Decrease

2. Decrease Increase

3. Increase Increase

4. Decrease Decrease

5. Zero Decrease

40. A light ray which is emerge from ground level with angle to the vertical is passing up through an air which has reducing refractive index. If the vertical height it moves is H and horizontal distance is D, which one of the following graphs shows the correct path of light ray?

H

D

D

H

H

D

1. 2. 3.

H

D

H

D

4. 5.

41. A tank has a cylindrical hole H of diameter 2r at its bottom as shown in the diagram. The cylindrical block B of diameter 4r and height h is placed on the hole H to prevent the flow of liquid through the hole. The liquid in the tank stands at a height h1 above the top face of the block. The density of the liquid is and that of block is . If the liquid is gradually taken out

from the tank, the height h1 of the liquid surface above the top face of the block for which the

block just begins to rise is,

1. 2.

h1

h

B

3. 4. 2h

2r

5. h

42. A particle is projected along the line of greatest slope up a rough plane inclined at an angle of 45o with the horizontal. If the coefficient of friction is , the retardation is,

1. 2. 3. (1-½)

4. (1+½) 5.

43. A container of a large uniform cross-sectional area A resting on a horizontal surface holds two immiscible, non-viscous and incompressible liquids of densities d and 2d , each of height as shown in the figure. The lower density liquid is open to atmosphere. A solid cylinder of length L (L < ), cross-sectional area is immersed such that it floats with its axis vertical to the liquid interface with length in the denser liquid. The density of the solid is,

1. 2.

d

2d

Cylinder

3. 4.

5.

44. For potentiometer circuit,

A - Sensitivity varies inversely with the length of potentiometer wire and directly

propotional to potential deifference across the wire.

B - Accuracy of potentiometer can be increased only by increasing the length of wire.

C - Range depends upon the potential difference applied across the potentiometer wire.

1. Only (A) is true 2. Only (C) is true

3. Only (A) and (B) is true 4. Only (B) and (C) is true

5. All (A),(B) and (C) are true.

45. In the part of the circuit shown in the figure, the potential difference (VG -VH) between points

G and H,

2

G

2A

4

3 V

3

1

5 V

H

3A

1A

2

1. 0 V

2. 3 V

3. 5 V

4. 7 V

5. 10 V

46. A vbibrating string of certain length L under tension T resonates with a mode corresponding to the first overtone of an air column of length 75 cm inside a tube closed at one end. The string also generates 4 beats per second when excited along with a tuning fork of frequency n.

Now when the tension of the string is slightly increased, the number of beats reduces to 2 per second. Assuming the velocity of sound in air to be 340 ms-1, the frequency f1 of tuning fork

is,

1. 344 Hz 2. 340 Hz 3. 336 Hz

4. 332 Hz 5. 328 Hz

47. System shown in the figure is released from rest with mass 2kg in contact with ground. Pully and spring are massless and friction is absent everywhere. The speed of 5kg block when 2kg block leaves the contact with ground is (spring constant of spring = 40Nm-1)

5kg

2kg

1. 4 ms-1

2. 4 ms-1

3. 3 ms-1

4. 2 ms-1

5. 2 ms-1

48. In the circuit shown in figure, what is the value of R to have zero potential difference across

P?

P

Q

E, r1

R

E, r2

R

1. r2 - r1

2. (r2 - r1)

3. r1 - r2

4. r1 + r2

5. (r2 - 1)

49. Diagrams shows three ways of a cell of emf E and internal resistance r is connected to four resistors. Which statement is true about currents through circuits?

I 2

1

2

1

2

E, r

I 3

E, r

2

2

1

1

I1

E, r

1

2

2

1

1. I1 = I2 and I3 is greater than that 2. I1 = I3 and I2 is smaller than that

3. I1 = I2 = I3 4. I1 I2 I3

5. I1 = I3 and I2 is greater than that

50. A metal rod of mass M and length L is placed on a frictionless parallel, horizontal rail in a magnetic field of flux density B directed into the paper as shown in the figure. (The rail is a conductor and a resistor of value R is connected to rail as shown). If an initial velocity V, is given to the rod and release, it will begin to move in the direction of Vo with an acceleration of,

1. -

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

R

L

Vo

2.

3.

4. -

5. -