AMHRA REGIONAL STATE EDUCATION BUREAU
PHYSICS MODEL EXAMINATION FOR GRADE 12 STUDENTS /2014E.C

**Number of items: 50**

**Time allowed: 2 hours**

**General directions**

Each of the following questions is followed by four possible alternatives. Read each question and write the letter of your best choice on the separate answer sheet provided.

You may refer the information given below when you work on some of the questions.

| **Name of constants** | symbol | **Value** |
|---|---|---|
| Acceleration due to gravity | $\vec{g}$ | 10.0m/$s^2$ |
| Electrical permittivity of free space | $\varepsilon_0$ | 8.85× $10^{-12}$F/m |
| magnetic permeability of free space | $\mu_0$ | $4\pi \times 10^{-7}$ T/ m.A |
| Charge of an electron | e | -1.6× $10^{-19}$C |
| Universal gravitational constant | G | 6.67× $10^{-11}$N$m^2/kg^2$ |
| Electrostatic force constant | K | 9.0× $10^9$ N$m^2/c^2$ |
| Speed of light in vacuum | C | 3.0× $10^8$m/s |
| Threshold of hearing intensity | $I_0$ | $10^{-12}$ w/$m^2$ |
| Density of water | $\rho$ | 1000kg/$m^3$ |
| Natural logarithm | ln 2 | 0.693 |
| $\sin 30° = \cos 60° = 0.5$,<br>$\sin 60° = \cos 30° = 0.87$ | | $\sin 45° = \cos 45° = \frac{\sqrt{2}}{2}$<br>$\sin 37° = \cos 53° = 0.6$<br>$\sin 53° = \cos 37° = 0.8$ |

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1. The momentum of a 5 kg ball is equal to the momentum of a 4kg block travelling at a velocity of 10m/s. What is the kinetic energy of the ball?

   A. 60J
   B. 100J
   C. 160J
   D. 200J

2. _____is a disturbance in matter that carries energy from one place to another place and travels through a medium.

   A. Micro wave
   B. Mechanical wave
   C. Ultra sound wave
   D. Electromagnetic wave

3. A particle is located at a position vector $\vec{r} = (2\hat{\imath}+3\hat{\jmath})$ m and the force acting on it is equal to $\vec{F} = (9\hat{\imath}+3\hat{\jmath})$ N. What torque is acting on it about the origin?

   A. 21Nm in the $+\hat{k}$ direction.
   B. 21Nm in the $-\hat{k}$ direction.
   C. 27Nm in the $-\hat{k}$.direction.
   D. 27Nm in the in the $+\hat{k}$ direction.

4. 7500J of heat is added to 2 moles of an ideal mono atomic gas initially at a temperature of 500K, while the gas performs 500J of work .What is the change in internal energy of the gas?

   A. 7000J
   B. 6000J
   C. 8000J
   D. 9000J

5. An ideal battery dissipates 1.6 watt, when connected to a 10 Ohm resistor. What are the e.m.f of the battery and the current in the resistor respectively?

   A. 4V and 0.4A
   B. 0.4V and 4A
   C. 1.6V and 10A
   D. 10V and 1.6 A

6. Which of the following statement is **correct**?

   A. Irreversible process is a process that can be reversed through finite changes in the system.
   B. Complete conversion of energy from hot source in to work is possible.
   C. There are processes in which there is an overall decrease in entropy.
   D. Entropy is a measure of the amount of disorder.

7. ____ is a thermodynamic system in which there is no transfer of heat energy, matter as well as work on /by the system.

   A. Isolated system
   B. closed system
   C. Insulated system
   D. Opened system

8. A string of 0.5m long is used to whirl a 1kg particle in a vertical circle at uniform speed of 5 m/s. What is the tension in the string when the particle is at the **top** of the vertical circle?

   A. 30N
   B. 40N
   C. 50N
   D. 60N

9. If the sound intensity level at a distance of 5m from a source is 120dB then, what would be the sound intensity level at a distance of 50m?

   A. 0dB
   B. 4dB
   C. 40dB
   D. 100dB

10. Two circuits have a mutual inductance of 0.3H.What is the average magnitude of emf induced in the coil when the current in the other coil changes from 10A to 40A in 0.01second?

   A. 90V
   B. 900V
   C. 120V
   D. 1200V

11. In simple harmonic motion when a body is displaced at its maximum position its potential energy becomes:

   A. Minimum.
   B. Equal to kinetic energy.
   C. Maximum.
   D. Half of the total energy

12. An inelastic collision is the collision in which:

A. Total momentum is not conserved but kinetic energy is conserved.
B. Total mass is not conserved but total momentum is conserved.
C. Neither total kinetic energy nor total momentum is conserved.
D. Total momentum is conserved but total kinetic energy is not conserved.

13. In double slit experiment, the slit separation is 0.20cm and the slit to screen distance is 1m.What is the distance between first order maxima and central maxima if wave length of the source is 500nm?

A. 0.45mm
B. 0.35mm
C. 0.25mm
D. 0.55mm

14. Huygens's principle states that:

A. the secondary wavelets combine to produce a new wave front which has a shape different from the original wave front.
B. all points a long a wave acts as a source of plane secondary wavelets that travel at a speeds and frequencies greater than that of the original wave.
C. the secondary wavelets are parallel to the original wave front,
D. all points along a wave behave as a source of spherical secondary wavelets that have the same frequencies and speeds as the original wave.

15. What will happen to the force of interactions between two tiny charged spheres if each of their charge is doubled and the distance between them is also doubled?

A. It becomes one-fourth.
B. It becomes one half.
C. It stays unchanged.
D. It will be doubled

16. Water is flowing through horizontal pipe with a speed of $15m/s$, where the pressure is 1.5 x $10^5$Pa and cross-sectional area 4 $cm^2$.What is the pressure at a point where the cross-sectional area of the point is $12cm^2$?

A. 2.5 x $10^5$ Pa
B. 1.5 x $10^5$ Pa
C. 2.25 x $10^5$ Pa
D. 0.5 x $10^5$ Pa

17. The resistance of an Ohmic conductor is **independent** of:

A. the voltage applied on it.
B. the nature of the material.
C. the temperature.
D. the size of the material.

18. Unit vectors which are perpendicular to the plane formed by vectors $\vec{A}$ =2$\hat{\imath}$ -6$\hat{\jmath}$-3$\hat{k}$ and $\vec{B}$ = 4$\hat{\imath}$ +3$\hat{\jmath}$- $\hat{k}$ are;

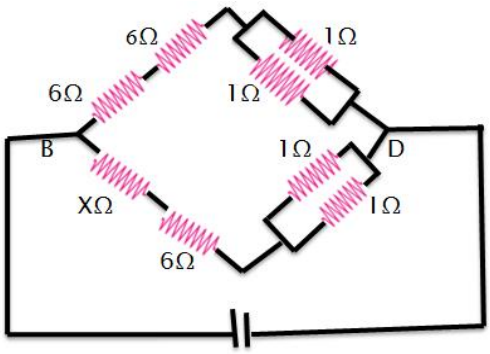
A. $\pm(\frac{3\hat{\imath}}{7} - \frac{2j}{7} + \frac{6\hat{k}}{7})$

B. $\pm(\frac{3\hat{\imath}}{7} + \frac{2j}{7} + \frac{6\hat{k}}{7})$

C. $\pm(\frac{3\hat{\imath}}{7} - \frac{2j}{7} - \frac{6\hat{k}}{7})$

D. $\pm(\frac{-3\hat{\imath}}{7} - \frac{2j}{7} + \frac{6\hat{k}}{7})$

19. For what value of X will the potential difference between **B** and **D** be zero in the arrangement shown below?




A. 2 Ω
B. 4 Ω
C. 3 Ω
D. 6 Ω

20. The acceleration of a simple harmonic oscillator:

A. remains constant during its motion.
B. remains non zero.
C. attains its maximum value at its amplitude.
D. attains its maximum value at its equilibrium position.

21. What is the effect of heating a liquid on its refractive index?

A. The refractive index of the liquid increases due to heating.
B. Heating doesn't affect the refractive index of the liquid.
C. Increase or decrease depending upon rate ofheating.
D. The refractive index of the liquid decreases due to heating.

22. A charged particle is whirled in a horizontal circle on a frictionless table by attaching it to a string fixed at one point. If a magnetic field is switched on in the vertical direction, what will happen to the tension in the string?

A. It will increase.
B. It will remain the same.
C. It will decrease.
D. It may decrease or increase depending on the sign of charge.

23. _____ is a superposition of two or more similar waves in a medium.

A. Diffraction
B. Interference
C. Reflection
D. Refraction

24. How far from a straight current- carrying wire carrying a current of 30A is the strength of the magnetic field $1.5\times 10^{-6}$T?

A. 0.4 m
B. 4m
C. 40m
D. 400m

25. A weight of 700N man stands on a scale on the floor of an elevator ,the scale measure and records the force it exerts on whatever on it .What is the scale reading if the elevator has an acceleration of 10 m/$s^2$ down?

A. 0N
B. 1N
C. 700N
D. 1400N

26. Let a charged particle, **q** enters in to uniform external magnetic field. Which one of the following statements is **false** about magnetic force on it?

A. Magnetic force is perpendicular to both $\vec{v}$and$\vec{B}$.
B. Magnetic force is zero if $\vec{v}$= 0 or $\vec{B}$= 0
C. Magnetic force does no work on **q** in displacing it in the field.
D. Magnetic force exerted on negatively charge is also in the same direction as the force on positively charge.

27. The moment of inertia of a body **does not** depend on:

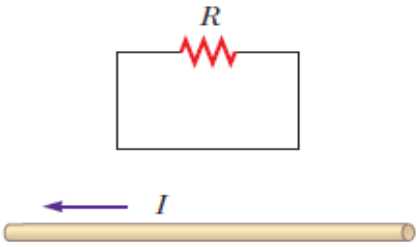
A. the angular velocity of the body.
B. the position of axis of rotations of the body.
C. the position of the body from the axis of rotation.
D. the shape of the body.

28. The activity of a radioactive source falls to one sixteen of its original value in 32 minutes. What is the half-life, in minutes of this decay process?

A. 2min
B. 8min
C. 4 min
D. 16 min

29. What is the direction of the current induced in the resistor when the current in the long, straight wire as shown in the figure decreases rapidly to zero?

A. Clockwise direction.
B. Anticlockwise direction.
C. Up ward direction.
D. Downwar direction .




30. What is the main use of step-up transformer?

A. To increase output power.
B. To decrease DC voltage.
C. To increase AC voltage.
D. To decrease AC voltage.

31. An object moves at constant speed of 5 m/s along a straight line from point A to point **B** and then back along the same line from **B to A** at constant speed of 3m/s**.** What is the average speed of the object for the entire trip**?**

A. 0.35m/s
B.2.75m/s
C.4.75m/s
D. 3.75m/s

32. A steel of wire has 5 m long at a temperature of 20℃. What is the change in length of the wire on a hot day of temperature 35℃? (Use coefficient of linear expansion of steel 1.2 x $10^{-5}$/℃ )

A.0.9mm
B.1.2mm
C.2mm
D. 3mm

33. After direct measurement the length of an object is reported to be 287.5 cm. On which statement the measurement described **wrongly**?

A. The digit 2, 8, 7 are certain digits.
B. 5 is uncertain digit.
C. 5 is certain digit.
D. The measurement is expressed by 4 significant digits.

34. Let $\overrightarrow{\boldsymbol{A}}$ and $\vec{\boldsymbol{B}}$ are non- zero vectors. Which one is **false** about the two vectors?

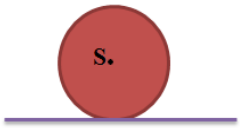
A. $(\vec{A} \times \vec{B}) \cdot \vec{A}=0$
B. $\vec{A} \times \vec{B}$ is parallel to both $\overrightarrow{A}$ and $\vec{B}$
C. $(\vec{A} \times \vec{B}) \cdot \vec{B}=0$
D. $(\vec{B} \times \vec{A}) \cdot \vec{B} \neq 0$.

35. A 0.6kg particles has a speed of 2m/s at appoint A. The total work done on the particle as it moves from point A to point B is 3.6J.What is the speed of the particle at point B?

A. 4m/s
B. 5m/s
C. 16m/s
D. 25 m/s

36. Find the moment of inertia of a solid sphere of mass, M and radius, R about an axis that is tangent to the sphere as the shown the figure below?

($I_{CM} = \frac{2}{5}MR^2$)




A. $\frac{2}{5}MR^2$
B. $\frac{7}{5}MR^2$
C. $\frac{5}{2}MR^2$
D. $\frac{5}{7}MR^2$

37. The bulk modulus of water is $2.1 \times 10^9$pa.What is the volume contraction of 6liters of water when subjected to a pressure $7 \times 10^5$ pa?

A. 3 liter
B. $3 \times 10^{-3}$liter
C. $2 \times 10^{-3}$ liter
D. $1 \times 10^{-3}$liter

38. In uniform circular motion the _____of moving body is constant.

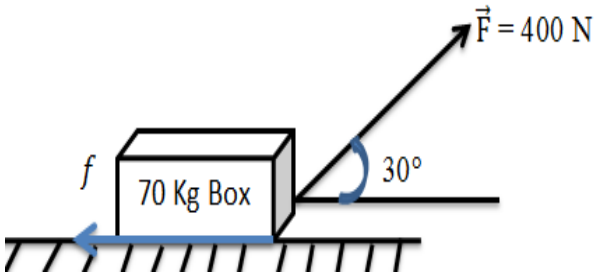
A. velocity.
B. magnitude of tangential velocity.
C. centripetal acceleration.
D. centripetal force

39. An object is projected at an angle of $45^0$ above the horizontal. Its maximum height is 2m. What is its range?

A. 0.5m
B. 2m
C. 3m
D. 8 m

40. A70kg box is pulled by 400 N forces at an angle of 30° to the horizontal like the figure given below. The coefficient of friction between the surface and the floor is 0.5. What is the magnitude of acceleration of the box?

A. 0.4 m/$s^2$
B. 2.4 m/$s^2$
C. 1.4 m/$s^2$
D. 3.4 m/$s^2$




41. A Force of 40N is used to stretch a spring which has a spring constant of 80 N/m on a horizontal frictionless surface .How much energy is stored in the spring?

A. 0.1J
B. 20J
C. 10J
D. 100J

42. A sphere initially revolving with an angular speed of 5πrad/sec slows down uniformly and stops in 10 seconds. How many revolutions does the sphere make during this time?

A. 6.25
B. 15
C. 12.5
D. 25

43. The necessary and sufficient condition for an object to be in equilibrium is:

A. *If* $\sum \tau = 0$, about its center of mass.
B. If $\sum \tau = 0$ *and* $\sum F = 0$, about its center of mass.
C. *If only* $\sum F = 0$, about its center of mass.
D. *If* $\sum F \neq 0$, about its center of mass.

44. The weight of a 2kg object totally immersed in water is 15N but the weight of this object when totally immersed in another liquid is 18N. What is the density of the other liquid in $kg/m^3$?

A. 250 $kg/m^3$
B. 325 $kg/m^3$
C. 400 $kg/m^3$
D. 600 $kg/m^3$

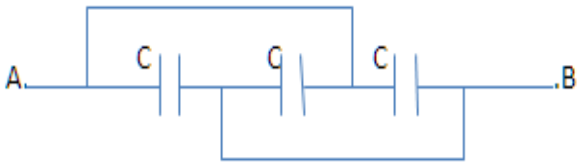
45. Which one of the following is **false** about laminar and turbulent flow type?

A. In turbulent flow the velocity of every molecule at a certain point never varies with time.
B. In laminar flow the fluid flows smoothly.
C. In turbulent flow the stream lines are not parallel.
D. In turbulent flow there is disruption between the layers

46. Three resistors 12Ω, 4 Ω and 6 Ω resistors are connected in parallel the combination of these three resistors is connected in series with 7 Ω resistors and 28 volt DC source. What is the current through the 12 Ω resistor?

A. 0.22A
B. 0.52A
C. 0.91A
D. 0.41A

47. As shown in the figure below, the net capacitance produced between point A and B is:




A. C
B. 2C
C. 3C
D. C/3

48. Which of the following physical quantity changes during projectile motion around the surface of Earth when, the effect of force of air resistance on the motion of the projectile is neglected?

A. Horizontal velocity of the projectile.
B. Vertical acceleration of the projectile.
C. Vertical velocity of the projectile.
D. Linear momentum of the projectile in the horizontal direction.

49. What are the main functions of capacitors?

A. To change alternate current to direct current.
B. To store electric energy and charge.
C. To transfer electrical energy from one circuit to another by electromagnetic induction.
D. To dissipate electric power.

50. Which one is the best source of magnetic field?

A. A conductor without electric current.
B. Stationary electric charge.
C. Non-magnetic materials
D. Movable charge.

**THE END**