AMHRA NATIONAL REGIONAL STATE EDUCATION BUREAU

PHYSICS MODEL EXAMINATION FOR GRADE 12

MEGABIT/2015E.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.

Physical Constant	Symbol	Value(or magnitude)
Acceleration due to gravity	$\overrightarrow{g}$	10.0 m/s^2
Plank's constant	h	6.63×10^{-34} JS
Magnetic permeability of free space	μ_0	$4\pi \times 10^{-7}$ T/ m.A
Charge of an electron	e	1.6×10^{-19} C
Density of water	ρ_{water}	1000 kg/m^3
1ev =1.6×10^{-19} J $\sin 37° = \cos 53° = 0.6$ $\sin 53° = \cos 37° = 0.8$		

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1. Which term is used to describe the closeness of repeated measurements of a physical quantity with each other under unchanged conditions?

   A. Accuracy
   B. Precision
   C. Error
   D. Uncertainty

2. Which expression is **CORRECT** about vector $\vec{A}$, $\vec{B}$ and $\vec{C}$

   If $\vec{A} \times \vec{B} = \vec{C}$ and $\vec{A}$, $\vec{B}$ and $\vec{C}$ are not null vectors?

   A. $\vec{A}$ is parallel to $\vec{C}$.
   B. $\vec{B}$ is parallel to $\vec{C}$.
   C. $\vec{A} . \vec{C} = 0$.
   D. $\vec{C} . \vec{B} \neq 0$

3. In actual simple machines

   A. mechanical advantage is greater than velocity ratio.
   B. mechanical advantage is equal to velocity ratio.
   C. mechanical advantage is less than velocity ratio.
   D. mechanical advantage is unity.

4. P-type semiconductor material is formed by doping a pure semiconductor crystal with impurity atoms having

   A. three valence electrons.
   B. five valence electrons.
   C. either three or five valence electrons.
   D. four valence electrons.

5. A 3 meter long object is found to have expanded by 0.09 cm in length for a temperature raise of 60 ℃ . What is the coefficient of linear expansion of the object?

   A. 5.0×10^{-4} / ℃.
   B. 5.0×10^{-5} / ℃.
   C. 5.0×10^{-6} / ℃.
   D. 5.0×10^{-1} / ℃.

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6. According to second law of thermodynamics

   A. there is a heat engine that can convert all its input heat to useful work.
   B. heat energy flows spontaneously from a colder to hotter object.
   C. the overall entropy in the universe can decrease.
   D. the thermal efficiency of heat engines are always less than one.

7. How many images can be formed if a candle is placed between two parallel plane mirrors?

   A. Two
   B. Four
   C. Eight.
   D. Infinite

8. A steam engine has a boiler that operates at 300 K, the heat changes water to steam, which drives the piston. The exhaust temperature of the outside air is about 600 K. What is the maximum theoretical efficiency of the engine?

   A. 25 %
   B. 50 %
   C. 35 %
   D. 60 %

9. A cylinder of cross-sectional area 100 cm^2 is fitted with a piston .It contains a gas at a pressure of 10^5 N/m^2 .When 300J of heat is added to the gas by keeping its pressure constant ,the gas expands and the piston moves out ward by 10cm. What is the change in internal energy of the gas in the cylinder due to the described thermodynamic process?

   A. -400J
   B. -200J
   C. 400J
   D. 200J

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10. Standing wave is produced by the superposition of two waves with

    A. the same amplitude, frequency, and direction of propagation.
    B. the same amplitude and frequency travelling in opposite direction.
    C. the same amplitude and direction of propagation, but different frequencies.
    D. the same amplitude, different frequencies, but opposite direction of propagation.

11. According to the need of material medium for their propagation, waves are divided in to mechanical and electromagnetic wave. So, which one is an example of mechanical wave?

    A. Radio wave
    B. String wave
    C. Infrared wave
    D. Visible light wave

12. A particle is vibrating in SHM with amplitude of 4cm. At what distance from its equilibrium position is its energy half potential and half kinetic energy?

    A. 2 cm
    B. $8\sqrt{2}$ cm
    C. $4cm$
    D. $2\sqrt{2}$ cm

13. Two slits separated by 1.00 mm are illuminated by a laser, so interference is produced on a screen at distance of 2.00 m from the slits .The separation between adjacent bright fringes on the screen is measured to be 1.26 mm. What was the wavelength of the laser?

    A. 560 nm
    B. 630 nm
    C. 480nm
    D. 521nm

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14. Which of the following statement describes about Pascal's principle in a better way?

A. In a given liquid the pressure exerted by the liquid decreases when its depth increases.
B. Pressure applied to an enclosed fluid is transmitted to every part of the fluid without reducing in value.
C. The pressure exerted by static liquid doesn't depend on the depth of the liquid.
D. Pressure change in an enclosed liquid is transmitted to every part of the liquid unequally.

15. A Gaussian closed surface enclosed an electric dipole. What is the total electric flux through the closed surface?

A. 0
B. $\frac{2Q}{\varepsilon_0}$
C. $\frac{Q}{2\varepsilon_0}$
D. $\frac{Q}{\varepsilon_0}$

16. A parallel plate capacitor has a capacitance of $2x10^{-12}$ F and it is charged to 3.2 V. How many excess electrons are there on one of its plate?

A. 1.77×10^8 electrons.
B. 1.77×10^7 electrons.
C. 4.00×10^7 electrons.
D. 1.2×10^7 electrons

17. Which statement is **FALSE** about a charged conductor on which all its net charge distributes on its upper most surface?

A. The potential difference between two points is zero everywhere inside the conductor.
B. Electric potential is constant everywhere inside the conductor.
C. The electric field is zero everywhere inside the conductor.
D. Electric field strength is least at the outer surface of the conductor.

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18. Kirchhoff's loop rule is direct consequence of

A. Newton's second law.
B. conservation of momentum.
C. conservation of energy.
D. Conservation of charge.

19. A metal rod of 1mm diameter has a resistance 0.01 Ω .What would be the resistance of the same metal and length if its diameter were doubled?

A. 0.0025 Ω
B. 0.05 Ω
C. 0.005 Ω
D. 0.02 Ω

20. Among the given alternatives which one describes, the difference between magnetic field force and electric field force exerted on charged particle in a better way?

A. Electric field can exert force on stationary and movable charge but magnetic field cannot exert force on stationary charge particle.
B. Magnetic field can exert force on stationary charge but electric field can exert force only on movable charge.
C. Magnetic field never exerts force on moving charge but electric field can.
D. Electric field can exert force only on moving charged particle but magnetic field can exert force on stationary charge only.

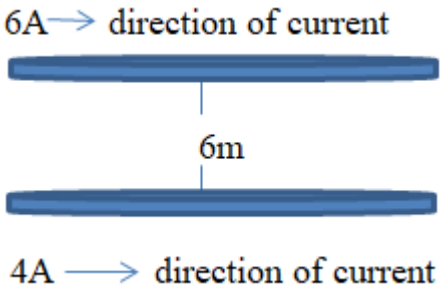
21. Which of the following term is used for the effect in which a changing current in one circuit induces an emf in another circuit?

A. Self-induction
B. Interference
C. Lenz effect
D. Mutual induction

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22. Two long parallel conductors which are 6 meter apart are carrying currents in the same direction (towards the right) as shown the figure below. What is the net magnetic field at the midpoint between the two conductors?

A. 13.3μ T out of the page
B. 13.3μ T into the page
C. 26.6μ T out of the page
D. 0.133μ T into of the page\



23. What is the self-inductance of a coil if the magnetic flux of 10.0 μ Wb is linked with the coil when the current 5mA flows through it?

A. 2 mH
B. 5 mH
C. 20 mH
D. 250 mH

24. A 44 mH inductor is connected to Ac power supply whose rms voltage is 220V and whose frequency is 50 Hz . What is the rms value of the current in the circuit?

A. 10.9 A
B. 11.9 A
C. 15.9 A
D. 18.9A

25. Which process describes about the emission of electrons from a metal surface when a light of suitable frequency illuminated on the surface?

A. Photo electric emission.
B. Thermionic emission.
C. Field emission.
D. Recombination process.

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26. One of the following statements does **NOT** describe about the conclusion of Rutherford's nuclear model of the atom?

A. Most of the atom is empty space.
B. Most of the mass of the atom is concentrated in tinny central nucleus.
C. There are positively charged particles within the nucleus.
D. Most of the mass of the atom is concentrated outside tinny central nucleus.

27. If the work function of metal 'x' is 3.315 eV . What is its threshold frequency?

A. 5×10^{14} Hz
B. 5×10^{15} Hz
C. 8×10^{14} Hz
D. 2×10^{14} Hz

28. Given two vectors $\vec{A} = 2\hat{\imath} - 6\hat{\jmath} - 3\hat{k}$ and $\vec{B} = 4\hat{\imath} + 3\hat{\jmath} - \hat{k}$. Which unit vector is parallel to $\vec{A} \times \vec{B}$?

A. $\frac{3}{7}\hat{\imath} - \frac{2}{7}\hat{\jmath} + \frac{6}{7}\hat{k}$
B. $\frac{3}{7}\hat{\imath} + \frac{2}{7}\hat{\jmath} - \frac{6}{7}\hat{k}$.
C. $-\frac{3}{7}\hat{\imath} - \frac{2}{7}\hat{\jmath} + \frac{6}{7}\hat{k}$.
D. $-\frac{3}{7}\hat{\imath} - \frac{2}{7}\hat{\jmath} - \frac{6}{7}\hat{k}$

29. When a force of $\overrightarrow{F} = (3\hat{\imath} + 4\hat{\jmath} + 2\hat{k})$ N acted on a particle, the particle displaced from a position of $(-\hat{\imath} - \hat{\jmath} - \hat{k})$ m to a position of $(3\hat{\imath} + 3\hat{\jmath} + 3\hat{k})$ m along a straight line. What amount of work was done by the force to displace the particle?

A. 36 J
B. 9 J
C. 24 J
D. 72J

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30. An object moves at a constant speed of 'v_1' along a straight path from point 'A' to point 'B' and then back along the same path from point 'B' to point 'A' at constant speed of ' v_2'. What is the average speed and average velocity of the object over the entire trip respectively?

A. $\frac{2\,v_1v_2}{v_1+v_2}$ and 0 m/s
B. $\frac{v_1v_2}{v_1+v_2}$ and 0 m/s
C. $\frac{3\,v_1v_2}{v_1+v_2}$ and 0 m/s
D. 0 m/s and $\frac{2v_1v_2}{v_1+v_2}$

31. If the gravitational acceleration of Earth at the floor of your class room is g. At what altitude (h) above the floor of your class room would the gravitational acceleration of Earth equal to $\frac{1}{2}$ g? (RE is radius of Earth)?

A. h= $\sqrt{2}$ RE
B. h = RE($\sqrt{2}$ -1)
C. h = $2\sqrt{2}$ RE
D. h = $3\sqrt{2}$ RE

32. Which force can be an example of non-contact force?

A. Tension on stretched string.
B. Electrostatic force.
C. Friction force.
D. Normal force.

33. The weight of a 2 Kg object when it is totally immersed in water is 15N but the weight of the same object when it is totally immersed with in another liquid is 18N. What is the density of the other liquid?

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

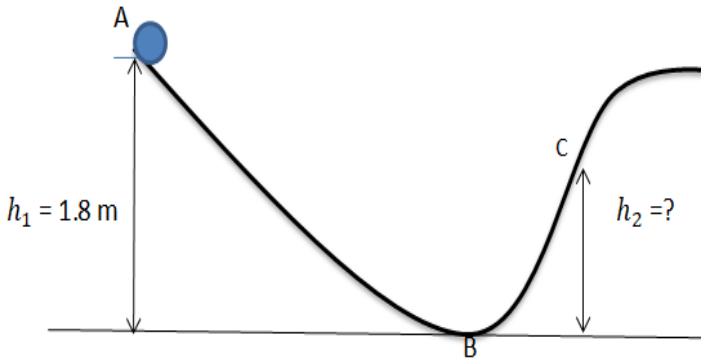
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34. When the absolute temperature of a black body doubles, the radiated power from it increases by

A. sixteen fold
B. eight fold.
C. two fold
D. four fold.

35. A particle is released from rest from point 'A' which is located at a height of 1.8 m and slides along a curved frictionless wire as shown the picture below. Its speed at point 'C' is 5 $\frac{m}{s}$. What are the value of h_2 and the speed of the particle at point 'B' respectively?

A. 0.45 m and 5 m/s
B. 0.55 m and 6 m/s
C. 0.2 m and 10 m/s
D. 1 m and 8 m/s



36. A particle of mass 100gm is fastened to a cord of 1 meter long and rotating in horizontal circle with constant speed .The tension in the cord is 2.5N. What is the tangential speed of the particle?

A. 10m/s.
B. 4m/s
C. 5m/s
D. 6m/s

37. A hailstone of mass 5.0×10^{-4}kg falls through the air and experiences a net force given by, F_{net}= - mg + cv^2 . Where C = $2.5\times 10^{-5}\frac{kg}{m}$, What is the terminal speed of the hailstone?

A. $\sqrt{2}$ m/s
B. $10\sqrt{2}$ m/s
C. 0 m/s
D. $\sqrt{10}$ m/s

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38. A child pushes horizontally on a box of mass 'm' which moves with constant speed 'v' across a horizontal floor. The coefficient of kinetic friction between the box and the floor is $'\mu'$.What is the mechanical power applied by the child to push the box?

A. μmgv
B. mgv
C. μmg/v
D. mg/v

39. In uniform circular motion

A. the velocity of moving object is constant.
B. the motion is held on one dimension.
C. the magnitude of acceleration is constant.
D. the net force on moving object is constant.

40. A rigid body is said to be in rotational equilibrium

A. if and only if the vector sum of all the forces acting on the center of mass of the body is zero.
B. if and only if the vector sum of the torques due to external forces acting on the body with respect to any specific point is different from zero.
C. if and only if the object is at rest.
D. when it doesn't rotate at all or rotates at constant angular velocity.

41. What happen when light moves obliquely from a material with high index of refraction to low index of refraction?

A. Its wavelength decrease.
B. Its speed decrease.
C. The refracted ray bends away from the normal line to the surface.
D. The refracted ray bends toward the normal line to the surface.

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42. A football player kicks a ball of mass 100gm at an angle of 53^0 from the ground with an initial velocity of 12m/s. What is the maximum height to which the ball will rise?

A. 4.608m.
B. 13.824m.
C. 6.608m.
D. 2.304m

43. The resistance of a conductor

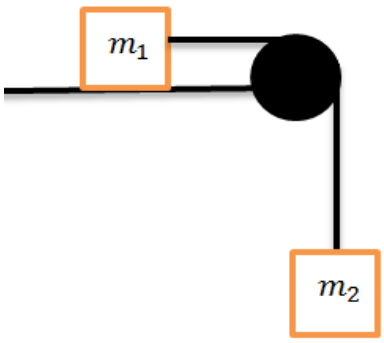
A. depends on its cross sectional area, its temperature and its length.
B. depends on the potential difference between the ends of the conductor.
C. depends on the current through the conductor.
D. decreases when its temperature increases.

44. A force produces an acceleration of 6 m/s^2 on an object of mass, m_1 and the same force accelerates a body of mass, m_2 by 2 m/s^2 . What is the value of m_2 in terms of, m_1 ?

A. 2 m_1
B. $3m_1$
C. $4m_1$
D. $6m_1$

45. An object of mass m_1 = 3.80 kg placed on a frictionless horizontal table is connected to a string that passes over a frictionless pulley and it is fastened to a hanging object of mass m_2 = 7.20 kg as shown in the figure below. Find the magnitude of the acceleration of the objects.

A. 0.15m/s^2
B. 12 m/s^2
C. 7.2 m/s^2
D. 6.54 m/s^2



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46. A turntable disc rotates through 10 radians in 4 seconds and experiences uniform angular acceleration. If the disc starts from rest, what is its angular velocity at the end of the 4 seconds?

A. 2.5 rad/s
B. 5 rad/s
C. 40 rad/s
D. 20 rad/ s

47. When deforming forces are applied on a body, it undergoes a change in shape or size. The fractional (or relative) change in shape or size is called

A. tensile stress
B. stress
C. shear stress
D. strain

48. The definition of young's modulus is given by

A. force per unit area.
B. ratio of tensile strain to tensile stress.
C. ratio of tensile stress to tensile strain
D. force per unit elongation.

49. According to Newton's third law

A. action force is acted before reaction force.
B. the magnitudes of action and reaction forces are different.
C. action and reaction forces are exerted on two different objects at the same time
D. action and reaction forces are exerted on two different objects at different times.

50. Sound wave

A. is a type of transversal wave.
B. cannot transfer energy through air.
C. is a longitudinal wave consists of unrepeated pattern of compressions and rarefactions.
D. is a longitudinal wave consists of a repeating pattern of compressions and rarefactions

The end