UMMUL QURA HIGH SHOOL

Arowona Bus-Stop AmulokoAkanran Road, Ibadan.

THIRD-TERM EXAMINATION

CLASS: SSS 2 **SUBJECT**: Physics. **DURATION**: $1\frac{1}{2}$hours.

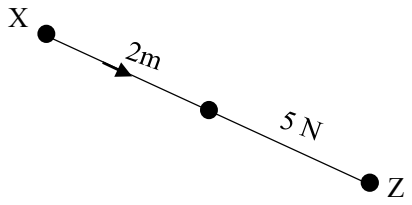
Instructions: Answer ***all*** questions in ***Section A*** and ***three*** in ***Section B.***

SECTION A: **OBJECTIVES**

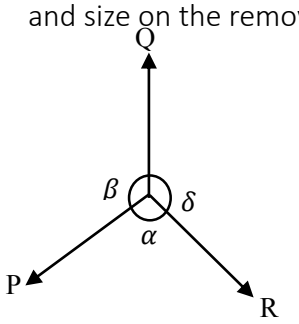
1. An additional load to an elastic wire when elastic limit has reached will ---- the wire.
   A. break
   B. recoil
   C. permanently strain
   D. vibrate at high temperature
2. If load of 1kg stretch a cord by 1.2 cm, what is the force constant if the cord? ---- N/m. [g=19m/s^2]
   A. 833
   B. 866
   C. 769
   D. 667
3. The term 'torque' means ----.
   A. the moment of a couple about an axis
   B. the resultant of several forces acting on a body in equilibrium
   C. two equal and opposite forces whose lines of action do not coincide
   D. two coplanar forces at right angles to each other
4. Which of the following statements are correct about an object in equilibrium?
   I. The total clock-wise moment of the forces about any point equal that total anti-clockwise moment about the same point.
   II. The total forces in one direction equals the total forces in opposite direction
   III. The resolved components along the x-axis equals the resolved components along y-axis.
   A. I, II and III
   B. I and III
   C. II and III
   D. I and II
5. The point beyond which a stretched spring does not return to its original length is called the ----.
   A. breaking point
   B. spring constant
   C. elastic limit
   D. release point
6. An object is acted upon by a system of parallel forces. The condition (s) for static equilibrium of the object is/are that the;
   I. Algebraic sum of all the moments of forces about a point is zero.
   II. Parallel forces must be equal in magnitude and direction.
   III. Resultant of the parallel forces is zero.
   A. I only
   B. II only
   C. I and III only
   D. II and III only
7. A technician applied a force of 250 N at the end of a spanner of length 0.25 m in order to loosen a nut, the moment applied to the nut is ---- Nm
   A. 1000.0

B. 625.0
C. 10.0
D. 62.5

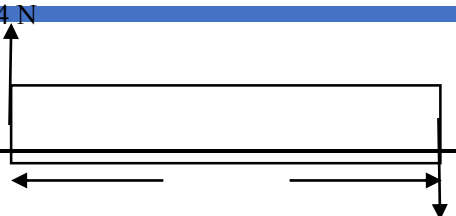
8. A load of 5 N gives an extension of 0.56 cm in a wire which obeys hook's law. The extension caused by a load of 20 N is --- cm.
   A. 2.24
   B. 1.12
   C. 2.64
   D. 2.14
9. Which of the following types of motion is produced by couple?
   A. Rotational
   B. Oscillatory
   C. Random
   D. Translational



10. A force of 5 N acts at a point y on the road XYZ as shown below. If XY is 2 m, the moment of the forces about point X is ---- Nm.
    A. 3
    B. 7
    C. 0
    D. 10
11. A spring of length 25 cm is extended to 30 cm by a load of 150 N attached to one of its ends. The energy stored in the spring is ---- J.
    A. 3.75
    B. 3750
    C. 2500
    D. 2.50
12. The ratio of tensile stress to tensile strain is known as -----.
    A. modulus if rigidity
    B. modulus of elasticity
    C. share modulus
    D. young's modulus
13. The S I unit of moment of force is -----.
    A. Nm
    B. N/m
    C. Nm^{-2}
    D. N/m^{-1}
14. Elasticity is the property which enables a material to ----.
    A. retain its deformed shape after the removal of an applied force
    B. be drawn out in length
    C. break without warning
    D. return exactly to its original shape and size on the removal of force

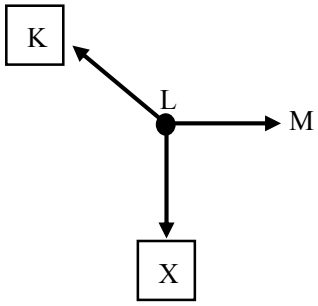


15. Three coplanar forces P, Q and R maintain a body S at equilibrium as shown in the figure below. It follows that;
    A. $\frac{P}{\sin\delta} = \frac{Q}{\sin\alpha}$
    B. Q sin α = R sin β
    C. P + Q = R
    D. Sinα = sin β = sin δ
16. A spring of force constant 300 N/m is compressed such that it's length shorten by 3 cm. The energy stored in the spring is ---- J.
    A. 137
    B. 25.2
    C. 0.14
    D. 0.135

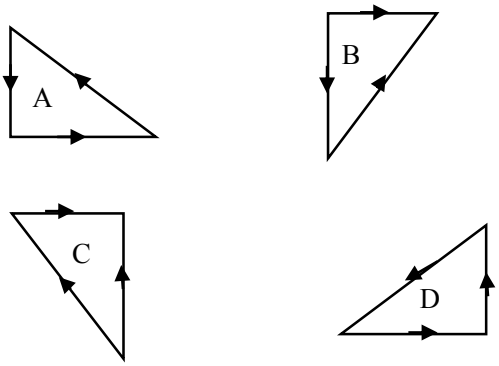


0.4 m

17. Two forces each of 4 N act on the opposite sides of a rectangular plane as shown below. The magnitude of the couple acting g on the plane is ---- Nm.
    A. 1.6
    B. 6.4
    C. 3.2
    D. 0.8

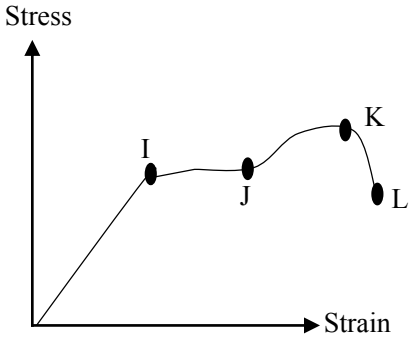


18. In the figure above the weight X is held in position by pulling the rope KLM in the direction of LM. Which of the following diagrams shown the forces acting at point L?

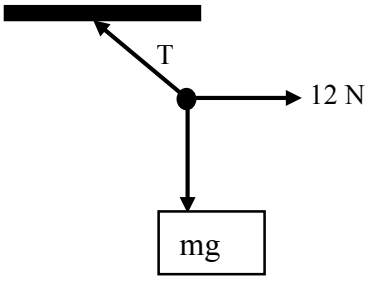


19. The property of a material that allows it to be stretched into a wire is called -----.
    A. brittleness
    B. malleability
    C. fragility
    D. ductility

20. Which of the following quantities has no unit?
    A. Tensile strain
    B. Tensile stress
    C. Young's modulus
    D. Shear modulus



21. The diagram above represents the stress-strain graph of a loaded wire. Which of these statements is correct?
    A. At I, wire becomes plastic
    B. L is the elastic limit
    C. J is the yield point
    D. At K, the wire breaks



22. A body of mass 0.5kg is suspended by a string and pulled by a horizontal force of 12 N as shown in the diagram above. The tension T in the string if the body is in equilibrium is ---- N. [g = 10 m/s^2.]
    A. 13.0
    B. 17.5
    C. 12.5
    D. 7.0

23. ----- is force per unit area.
    A. Strain
    B. Stress
    C. Vector
    D. Density
24. A piece of rubber 10 cm long stretches by 6 mm, when a load of 10 N is hung from it. The strain is ----.
    A. 0.06
    B. 0.006
    C. 0.6
    D. 6.0
25. The equilibrant of two or more concurrent forces is equal -----.
    A. to the difference in magnitude of forces
    B. in magnitude to the resultant but opposite in direction
    C. to the sum of the magnitude of the forces
    D. in magnitude and direction to the resultant
26. If a load of mass 10 N stretches a cord by 1.2 cm, the total work done is ---- x 10^{-2} J.
    A. 7.6
    B. 6.0
    C. 1.8
    D. 6.6
27. A single force which produces the same effect as a set of forces acting together at a point is known as the ----.
    A. resultant
    B. components
    C. equilibrant
    D. resistant
28. The center of gravity if a uniform triangular lamina is the point of intersection of ----.
    A. the perpendicular bisectors of its sides
    B. the medians
    C. the bisectors of its three sides
    D. the altitudes
29. The point at which the body turns is called the ----.
    A. forceps
    B. fulcrum
    C. cord
    D. dusk
30. Example of couples can be seen in ----.
    A. action of driver's steering wheel
    B. opening of soft drink cover
    C. movement if vehicles in a circular road
    D. zig-zag movement of smokes
31. An object is released from the top at height of 25 m. The time taken to fall to the ground is ---- s. [g = 10 m/s2.
    A. 25.0
    B. 10.0
    C. 2.59
    D. 2.24
32. Which of the following quantities is a vector?
    A. Force
    B. Speed
    C. Distance
    D. Mass
33. The slope of straight line velocity – time graph represents ----.
    A. uniform acceleration
    B. uniform speed
    C. total distance covered
    D. work done
34. Which of the following substances is most viscous at room temperature?
    A. Water
    B. Alcohol
    C. Petrol
    D. Palm oil

35. A 500kg car initially at rest was travelling with acceleration of 5 m/s^2. It kinetic energy after 4 s will be ---- J.
    A. 10^5
    B. 2.5×10^3
    C. 2×10^3
    D. 5×10^3
36. The unit of linear expansivity is ----.
    A. K^{-1}
    B. K
    C. $℃^{-2}$
    D. K^{-2}
37. Which of the following units is equivalent to watt?
    A. J/s^2
    B. N/m
    C. Nm
    D. J/s
38. The magnitude of the force required to make an object of mass M move with speed v in a circular path of radius r is ----.
    A. $\frac{Mv^2}{r}$
    B. $\frac{Mr}{v}$
    C. $\frac{Mv^2}{r^2}$
    D. $\frac{r}{Mv}$
    E. R
39. Which of the following source of energy is renewable?
    A. Petroleum
    B. Coal
    C. Natural gas
    D. Sun
40. Which of the following is the dimensions of pressure?
    A. $ML^{-1}T^{-2}$
    B. MLT^2
    C. ML^2T^{-3}
    D. MLT^{-3}
41. An object moves 4 m eastwards (t) and then 3 m southwards (s). Its displacement from its original position is?
    A. 1 m SE
    B. 7 m SE
    C. 5 m SE
    D. 12 m SE
42. A motor vehicle is brought to rest from a speed of 15 m/s in 20 s. The retardation is ---- m/s^2.
    A. 7.50
    B. 5.00
    C. 1.33
    D. 0.75
43. For a projectile, the maximum range is obtained when the angle of projection is ----.
    A. 45^0
    B. 30^0
    C. 90^0
    D. 75^0
44. The headlamp of a car takes a current of 0.4 A from 12 V supply. The energy produced in 5 minutes is ---- J.
    A. 1440
    B. 330
    C. 288
    D. 240
45. On a cold morning, the metal blade of a cutlass feels colder to the touch than the wooden handle because ----.
    A. the blade is at lower temperature than the handle
    B. the hand is at lower temperature than both blade and handle
    C. the blade is a better conductor of heat than the handle

D. the handle contains some heat which is absent in the blade

46. It is advisable to wear white dresses in the tropics because white can ----.
    A. reflect radiant heat
    B. absorb sweat readily
    C. conduct heat away more readily from the body
    D. absorb the rays from the sun
47. A brass rod is 2 m long at a certain temperature. It's length for a temperature rise of 100 k, linear expansivity of 18 x $10^{-6}K^{-1}$ will be ---- m.
    A. 2.0360
    B. 2.1800
    C. 2.0018
    D. 2.0036
48. Which of the following is not a consequence of a force field?
    A. Weight
    B. Gravitational force
    C. Surface tension
    D. Electrical force
49. The internationally agreed system of unit (S. I) for physical measurements are ----.
    A. Lb, ft, sec
    B. G, m, sec
    C. Kg, m, sec
    D. Kg, cm, sec
50. Which of the following is a fundamental unit?
    A. Second
    B. Joule
    C. Newton
    D. Watt

SECTION B: **THEORY**

Instructions: Answer any ***three*** questions from all **DURATION**: $1\frac{1}{2}$hours.

1. (a) Define the following;
    i. tensile stress
    ii. tensile strain
    iii. yield point

    (b) A wire of length 5.0 m and diameter 2.0 mm extends by 0.25 mm, when a force of 50 N was used to stretch it from its end. Calculate the;

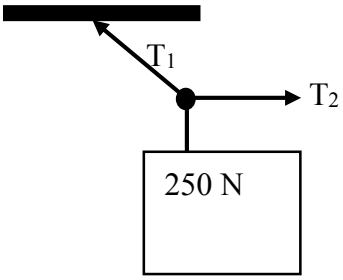
i. Stress on the wire.

ii. Strain in the wire. [π= 3.142].

2. (a) Explain equilibrium of forces.

(b) Differentiate between the resultant and the equilibrant forces.

(c) The diagram below in figure below illustrates three force T_1, T_2 and 250 in equilibrium. Calculate the magnitude of T_1 and T_2.



3. (a) iExplain elasticity of a substance.

ii Define elastic constant.

(b) Sketch a load – extension graph for the wire and on the graph indicate the

i. elastic limit

ii. yield point

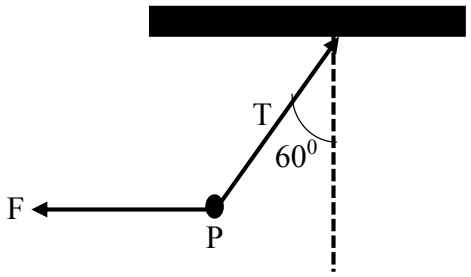
iii. maximum load

iv. breaking point

(c) A wire of length 2.00 mm and radius 1.0 mm is stretched by 25. 0 mm on application of a force of 10^3N. Calculate the young's modulus for the wire.

4. (a) State the principle of triangle of forces.

(b) The body P shown in the diagram below is in equilibrium. If the mass of the body is 10 kg, calculate the tension T in the string. [g = 10 m/s^2].



(c) A mass of 2.0 kg is suspended by two cords which makes angles of 30 and 50 with the vertical. Calculate the tension in the two cords [g = 10 m/s^2].

5. (a) Define the following;

i. moment of a force

ii. torque

(b) State the ***two*** conditions for equilibrium of parallel coplanar forces

(c) A weightless bar is pivoted at its center and weight of 5 N and 10 N, placed 3 m and 2 m respectively from the pivot on one side, are balanced by a weight of 20 N on the other side. How far is the 20 N weight from the pivot?

6. (a) Define the following;
    i. projectile
    ii. projectile motion

(b) A projectile is fired with an initial velocity of 100 m/s at an angle of 30 with the horizontal. Calculate;

i. the time of flight
ii. the maximum height attained
iii. the range. [g = 10 m/s^2]

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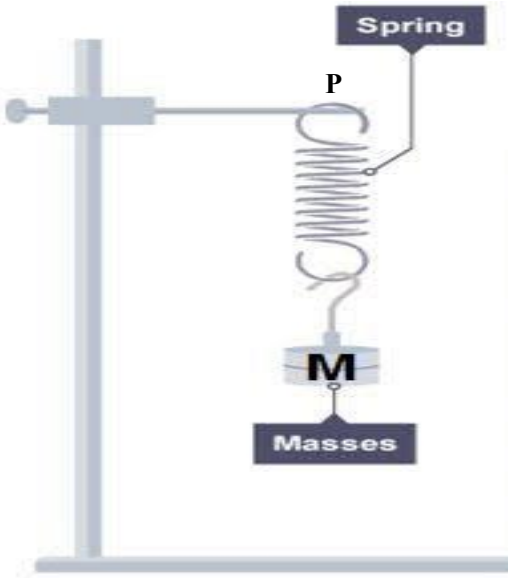
THIRD-TERM EXAMINATION

CLASS: SSS 2 **SUBJECT**: Physics. **DURATION**: $1\frac{1}{2}$hours.

Instructions: Answer ***all*** questions.

SECTION C: **PRACTICAL**



(a) The diagram on the above is that of an experiment set-up in which a spring is suspended from a fixed point **P**. A load of sufficient mass. **M** is initially attached to lower end of the spring. A further mass, m = 40g is added to the initial mass and the new load is displaced vertically to execute vertical oscillations. The time for 0 oscillations is taken. The experiment is repeated four more times by increasing the load in steps of 20g and another four more times, this time decreasing the load from the highest mass attained, in steps of 20g. Fig. 1.2 (a) in the next page shows the times, t = t_1, t_2, t_3, t_4, and t_5 for twenty oscillations during the loading process. Fig. 1.2 (b) shows the times, t' = t'_1, t'_2, t'_3, t'_4 and t'_5 during the unloaded process. (Note: t'_1 corresponds to t_1 for the same mass and so on)

i. Read and record both times corresponding to the same load in all the *five* trials of the experiment and determine the average time for each pair.

ii. Determine the period **T** for each of the oscillations and calculate $\mathbf{T^2}$ in each case. Tabulate the readings of the times and the periods of the oscillations.

iii. Plot a graph with $\mathbf{T^2}$ on the vertical axis and m on the horizontal axis. Determine the slop of your graph.

iv. State ***two*** precautions you would take when performing this experiment.

(b) Define period and frequency of the oscillation.

(c) What is the purpose of attaching the initial mass, **M** to the spring in (a) above?

(d) State how the oscillation in (a) above will be attached if an attached load stretched the spring permanently.

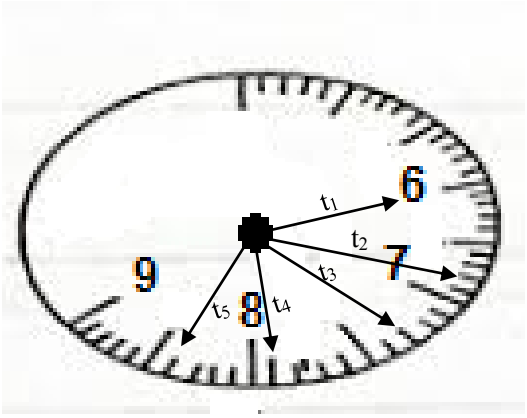


Fig. 1.2 (a)

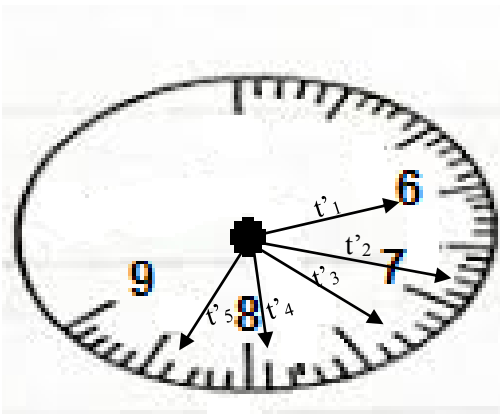


Fig. 1.2 (b)