END OF TERM 2 EXAM

TIME: 2HOURS

NAME M/S **ADM NO** ..... **CLASS** .....

INSTRUCTIONS.

ANSWER ALL THE QUESTIONS IN THE SPACES PROVIDED

SECTION A

1. Define the following terms as used on curved mirrors,

a) Principal axis (1mk)

It is the line joining the Centre of Curvature to the pole of the mirror.

c) Focal plane (1mk)

Is the plane perpendicular to the principal axis and passes through Principal focus (F).

2. State the ampere's swimming rule. (1mk)

It states that if one imagines to be swimming along a wire in the direction of the current and facing the compass needle then the north pole of the needle will be deflected towards the swimmers left hand.

3. Briefly describe any two applications of stability in real life situations. (2mks)

- A person carrying a bucket of water.
- Acrobats.
- Formation of Vehicles
- Luggage Compartments of buses.
- Bunsen burner formation
- Tripple stand formation

3. An oil drop has a volume of $0.14mm^3$ when it is placed on the surface of some water; it spreads out to form a circular patch of area $6.4 * 10^4\ mm^2$

a) Calculate the thickness of the oil film. (2mks)

$$T = \frac{\text{Volume of drop}}{\text{Area of patch}} = \frac{0.14mm^3}{6.4 \times 10^4 mm^2} = 0.0000021875\ MM$$

$$= 2.1875 \times 10^{-6} mm.$$

1

b) What two assumptions you have made above. (1mk)

- Oil drop is spherical
- Oil patch is circular
- The drop is one molecular thick

4. By the help of a ray diagram, show how an object at infinity forms its image on a converging mirror. (2mks)

6. Give any two factors that affect the strength of an electromagnet. (2mk)

- Number of turns of the wire
- Current size
- Length of the solenoid

7. The stability of a body can be increased by increasing the base area and lowering its Centre of gravity. State one way of lowering its Centre of gravity. (1mk)

Making the base as heavy as possible

8. Explain any two applications of concave mirrors in real life. (2mks)

- As shaving mirrors
- solar concentrators
- As dentist mirror

9. You are provided with two iron bars A and B one is magnetized and the other is not. Explain how you would identify the magnetized bar. (2mks)

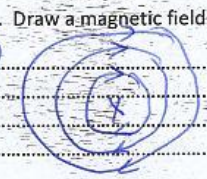
- Suspend the two bars using a rop/thread differently on a stand.
- ~~Apply~~ Duplicate both bars at the same time and let them swing until they settle. Repeat several times
- The magnetized bar will always settle on N-S 2 direction

10. Give a reason why attraction in magnetism is not regarded as a reliable method of testing for polarity. (1mk)

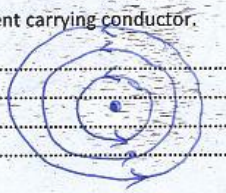
Attraction can occur between unlike poles and also between a magnet and a magnetic material.

11. Draw a magnetic field pattern around a straight current carrying conductor. (2mks)

(i)



(ii)



12. A convex mirror of focal length 18 cm produces an image on its axis, 6 cm away from the mirror. Determine the position of the object. (2mks)

$f = -18cm$

$v = -6cm$

$u = ?$

$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$-\frac{1}{18} = \frac{1}{u} - \frac{1}{6}$

$\frac{1}{u} = -\frac{1}{18} + \frac{1}{6}$

$\frac{1}{u} = \frac{1}{9}$

$u = 9\,cm$

13. A concave mirror has a focal length of 8cm. A real object of length 2cm is placed 12cm from the mirror. Using a suitable scale, determine the position of the image and the height of the image.

$f = 8cm$

$h_o = 2cm$

$u = 12cm$

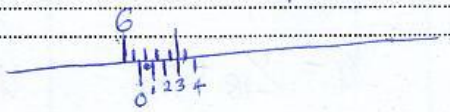
(3mks)

14. Sketch a Vernier caliper showing each of the following readings

a) 6.13 cm. (2mks)

M.S.R = 6.1 cm

V.S.R = 3mm

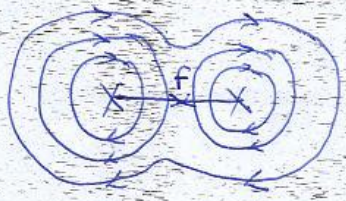


b) 2.14 cm. (2mks)

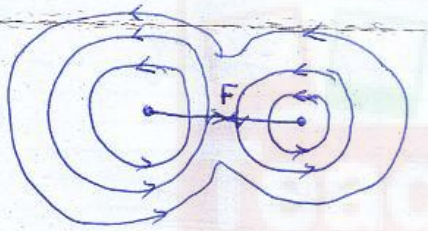
M.S.R = 2.1 cm.
V.S.R = 4mm

14. The following diagrams shows the cross-section of current carrying wires. Sketch the magnetic field around the wire

a) Xx (2mks)



b) • • (2mks)



15. State two qualities of a liquid which can be used in an experiment to determine the size of a molecule. (2mks)

- Should not evaporated easily
- Should be less dense that water / float on water.

16. Determine the position of the object, if its image is formed 12 cm from a convex mirror of focal length 18 cm. (2mks)

V = -12cm.
f = -18cm

$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

$\frac{1}{u} = \frac{1}{f} - \frac{1}{v}$

$\frac{1}{u} = \frac{1}{-18} + \frac{1}{12}$

$\frac{1}{u} = \frac{1}{36}$

$u = 36\text{cm}$

17. calculate the pressure due to water experienced by a fish 20 m below the surface of the sea.(density of water =1030kg/m^3) (3mks)

$P = h\rho g$

$= 20 \times 1030 \times 10$

$= 206000$ Pa

18. Explain why a small leaking laboratory gas tap in one corner of the room can be detected by a person in another corner of the room. (2mks)

Due to diffusion - the gas particles move from a region of highly concentration (corner) to the less concentrated area (the other corner).

19. Briefly differentiate between magnetic and non-magnetic materials. (2mks)

Magnetic material are materials that are affected by a magnetic force while non-magnetic material are materials that are not affected by a magnetic force.

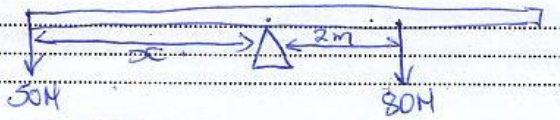
20. Why is repulsion the surest way of testing polarity of a magnet? (1mk)

Because repulsion only occurs between unlike poles but attraction can occur between unlike poles or between a magnet and a magnetic material.

21. What is the zero error in relation to Vernier calipers? (1mk)

This is the reading on Vernier calipers while it is closed and holding nothing.

22. A weight of 50N is hanging at the end of a uniform metal rod. A pivot is placed at the Centre of the rod is balanced by hanging a weight of 80N, 2 meters from the pivot. Calculate the length of the metal rod. (4mks)



$\frac{50x}{50} = \frac{2 \times 80}{50}$

$x = 3.2m$

length of the rod $= 3.2 \times 2$

$= 6.4m$

23. "Parallel forces can act in opposite direction." Give two practical applications of this. (2mks)

- Bicycle pedals
- Opening a water tap.

24. State the condition under which a body is said to be in mechanical equilibrium. (1mk)

If the clockwise and anti-clockwise forces are equal.

SECTION B

24. The following readings were obtained in an experiment to verify Hook's law using a spring.

Force(N)	0.5	1.5	2.5	3.5	4.0
Extension (m)	0.06	0.08	0.10	0.12	0.14

a) Plot a graph of force against extension. (5mks)

b) Determine the spring constant from the graph. (2mks)

$K = \text{Gradient} = \frac{\Delta f}{\Delta e} = \left(\frac{0.135 - 0.09}{4.1 - 1.9}\right)$ N/m

$= 0.020455$ N/M

c) From your graph determine the force for extension of;

i) 0.112m (1mk)

3.1 N.

ii) 0.111m (1mk)

2.9N.

d) State whether the spring obeys ohms law. (1mk)

Yes, the spring obeys the ohms Law, since the graph is a straight Line.

25. a) briefly explain what is meant by the following terms;

i) Centre of gravity of an object. 1mk

Is a point on a body where all its weights seems to act on.

ii) Equilibrium state. 1mk

A body is said to be at equilibrium if its clockwise moments equals its anti clockwise moments

b) Explain two ways of increasing the stability of a body. 2mks

- Making the base as heavy as possible
- Making the base as wide as possible
- Lower the centre of gravity.

c) Briefly describe how you would locate the Centre of gravity of a lamina 3mks

d) Discus any three practical applications of stability. 3mks

- Making of bunsen burner.
- Making a tripple stands
- A person carrying a bucket of water.
- Making of race cars