

Name:..... Class:..... Adm. No:..... Index No:.....

ALLIANCE HIGH SCHOOL

PHYSICS FORM IV CAT ONE TERM ONE 2016

TIME: 2 HOURS

INSTRUCTIONS TO THE CANDIDATE:

- (a) Write your name and class, admission number in the spaces provided above.
- (b) This paper consists of two Sections I and II
- (c) Answer all the questions in sections I and II in the spaces provided.
- (d) All working must be clearly shown in the spaces provided.

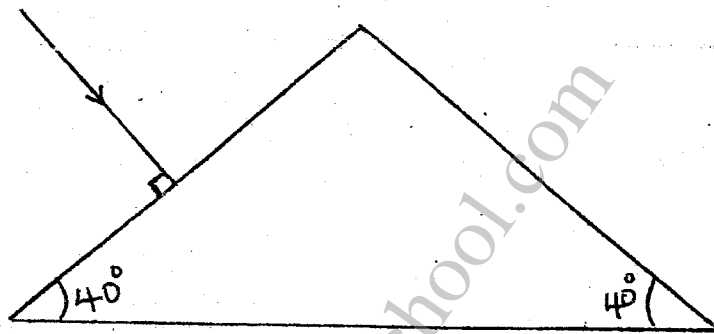
FOR EXAMINER'S USE ONLY:

Section	Question	Maximum Score	Candidate's Score
I	1 – 13	25	
II	14	13	
	15	14	
	16	10	
	17	10	
	18	14	
	19	14	
Total Score		100	

SECTION I (25 mks)

1. A boy observes his face in a concave mirror of focal length 100cm . If the mirror is 80cm away , state two characteristics of the image observed. (2mks)

2. In the figure below (not drawn to scale) , sketch the path of the ray until it emerges from the prism. (2mks)

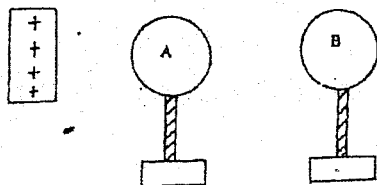


3. State the changes that can be observed during discharging process of a lead – acid accumulator. (2mks)

4. State one advantage of using optical fibres in communication. (1mk)

5. What property of light is suggested by the formation of shadows. (1mk)

6. A positively charged rod is brought close to two spheres A and B held by insulating handles as shown below.

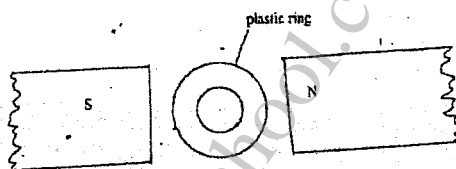


Indicate the charge on A and B.

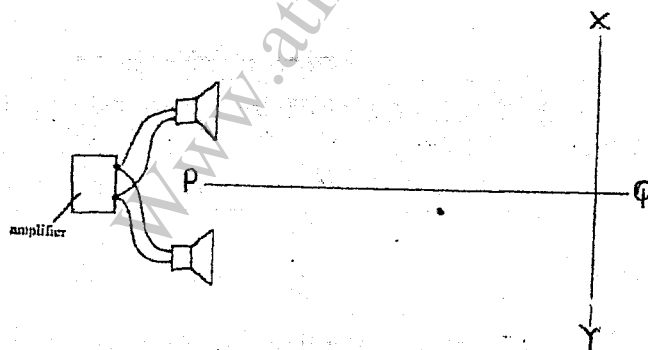
(2mks)

7. The figure below show two poles of a magnet and ring of plastic placed between them.
Show the magnetic lines of force between them.

(1mk)



8. Two loud speakers are connected to the output of an amplifier and arranged as shown below.



Two observers A and B , walk along the lines PQ and XY respectively. State and explain the observations made by :

Observer A

(2mks)

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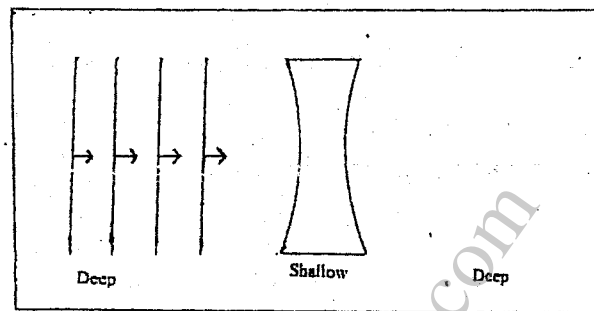
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Observer B

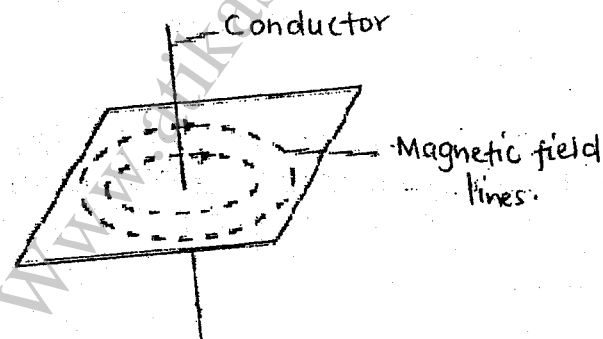
(2mks)

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9. The diagram below shows plane waves passing through a medium. The waves encounter a concave shallow region. Complete the diagram to show the nature of the waves after passing through the shallow region. (2mks)



10. The figure below shows the magnetic field pattern around a current carrying conductor. Indicate on the conductor the direction of the current. (1mk)



11. A cell supplies a current of 0.6A through a 2Ω coil and a current of 0.2A through a 7Ω coil. Calculate :

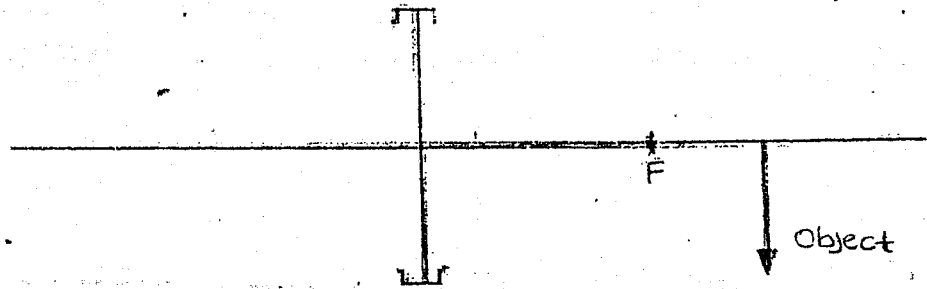
a) The e.m.f (3mks)

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b) Internal resistance of the cell. (2mks)

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12. The diagram below shows an object placed some distance from a concave lens: Construct the image on the diagram. (2mks)



13. A white paper is a good reflector of light but does not form an image like a mirror. Explain this observation. (1 mk)

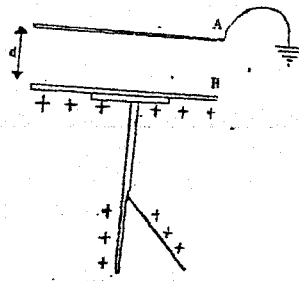
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SECTION II (75 mks)

- 14..a) Define capacitance of a capacitor. (1mk)

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The figure below shows a charged electroscope two aluminium plates A and B arranged as shown .



State and explain the observations made when :

i) d is reduced (2mks)

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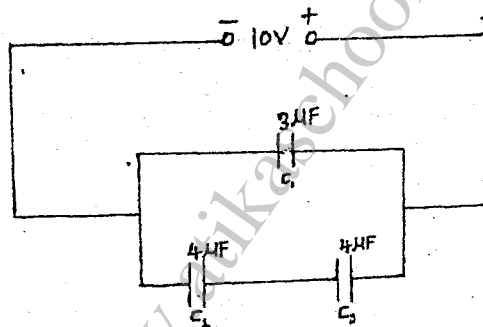
ii) the plate A is more horizontally (2mks)

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iii) a sheet of polythene is placed between A and B (2mks)

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b) Three capacitors are connected to a 10V battery as shown below.



Calculate :

i) the total capacitance. (3mks)

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ii) The charge on the 3μF capacitor. (3mks)

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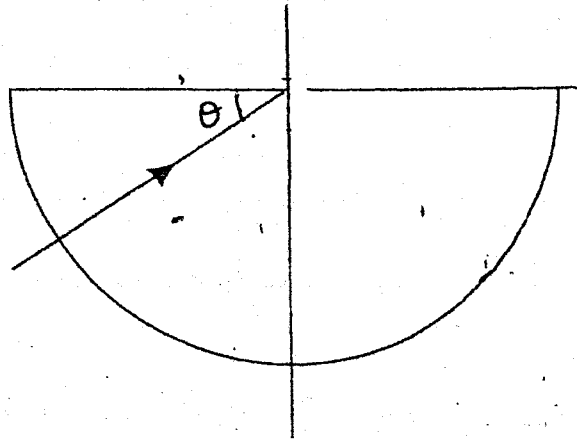
15.a) State Snell's law of refraction light. (1mk)

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b) Under what conditions does total internal reflection occur? (2mks)

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- c) The figure below shows a ray of light at a glass-air interface. Given that the refractive index of glass is 1.5, Calculate the angle θ (3 mks)



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- d) The table below shows the results of an experiment to determine the refractive index of a liquid

Real depth (cm)	0	7.5	15	20	25	30	45
Apparent depth (cm)	0	5.63	11.28	15.04	18.80	22.56	33.83

- (i) Plot a graph of apparent depth (y-axis) against real depth (x-axis). (5 mks)
- (ii) Use your graph to determine the refractive index of the liquid. (3 mks)

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16. a) A source generates 40 waves in a second. If the wavelength is 8.0cm. Calculate the time the wave takes to reach a wall 100m from the source. (3 mks)

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- b) State any two factors which affect the speed of sound. (2mks)

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- c) Distinguish between stationary and progressive. (1 mk)

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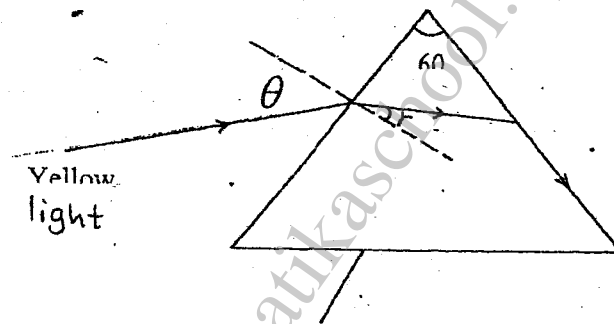
- d) A policeman standing between two high walls fires a gun. He hears the first echo after 3 seconds and the next 2 seconds later. What is the distance between the wall? (Take velocity of sound 330 m/s) (4 mks)

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17. The figure given shows the path of a ray of yellow light through a glass prism. The speed of yellow light in the prism is 1.88×10^8 m/s



- a) Determine the refractive index of the prism material (Speed of light in vacuum $C=3.0 \times 10^8$ m/s) (2 mks)

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- b) Show on the same figure above, the critical C, and determine its value. (4 mks)

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- c.) Given that $r = 31.2$ determine the angle. (3 mks)

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d.) On the same figure sketch the path of light after striking the prism if the prism was replaced by another one of lower refractive index. (Use dotted lines for your answer.) (1 mk)

18. a.) State the pressure law of an ideal gas. (1mk)

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b.) The pressure, P, of a fixed mass of a gas at a constant temperature $T = 300\text{k}$ is varied continuously. The corresponding value of P and the volume V of the gas are shown in the table below.

Pressure, P ($\times 10^5$)	2.00	2.50	3.00	3.50	4.00	4.50
Volume, V (m^3)	0.025	0.20	0.017	0.014	0.012	0.011

i) Given that $PV = 2RT$ where R is a constant, plot an appropriate graph. (7mks)

ii.) Use the graph to determine R. (3mks)

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c) A tin closed with an airtight lid contains air at a pressure of 1.0×10^5 Pa and temperature of 12°C . the tine is heated in a water bath until the lid opens. If the temperature at which the lid opens is 88°C , determine the pressure attained by the gas. (Ignore expansion of the tin). (3 mks)

19. a) State Newton's second law of motion. (1 mk)

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- b) A body resting on a horizontal surface is given an velocity, v so that it slides on the surface for some distance before coming to stop. The table shows the distances d moved by the body for various values of v .

Velocity, v (ms^{-1})	0.20	0.40	0.60	0.80	1.00	0.20
Distance, d (m)	0.007	0.027	0.056	0.110	0.170	0.200

- i) Given that $v^2 = 20ud$ where u is a constant for the surface, plot an appropriate graph. (7 mks)

- ii) Use your graph to determine u (3 mks)

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- c) A train of mass 200 tonnes starts from rest and accelerates uniformly at 0.5ms^{-2} . Determine its momentum after moving 100m. (3 mks)

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END