NAME INDEX NUMBER

WAVES II

1. 1994 Q7 P2

(a) Sketch a displacement-time graph of a wave of amplitude 0.5 cm and frequency 4Hz over a time interval of 1.25s (5marks)

(b) (i)State one condition ,not involving a phase difference, for an interference pattern to be observed (1 mark)

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(c) Two point sources S_1 and S_2 oscillate in phase producing waves of wavelength =1.0cm. The separation of the sources is 3.0cm

i). Draw to scale, on the plane paper provided, a series of 10 semi-circular lines to represent the wave fronts produced at intervals of one periodic time(T) for each of the two sources. (4 Marks)

ii). Draw on the same diagram, lines which represent positions of constructive interference (3 marks)

iii). Mark a point P on one of the lines drawn in b(ii)II Determine the magnitude of (S_2 P-S_1 P) and express it in terms of wavelength (2 marks)

2. 1995 Q16 P1

State two ways by which the frequency of a note produced by a given guitar wire may be increased

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3. 1995 Q25 P1

Name the property of light that shows that it is a transverse wave

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4. 1996 Q17 P1

Circular water waves generated by point sources at the centre. O of the pond are observed to have the pattern shown in figure 6

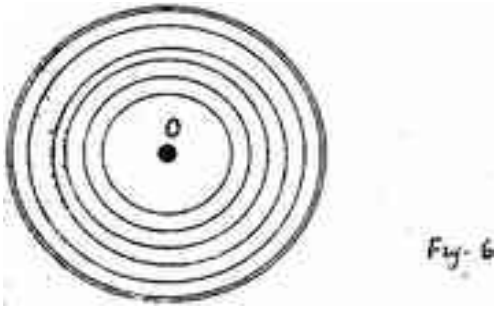

Fig. 6

Explain the pattern (2 marks)

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5. 1997 Q21 P1

Calculate the wavelength of the KBC FM radio wave transmitted at a frequency of 95.6 Mega Hertz.

(Speed of light C = 3.0×10^8 m/s)

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6. 1997 Q7 P2

a) i. Distinguish between transverse and longitudinal waves

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ii. Give one example of a transverse and one example of longitudinal.

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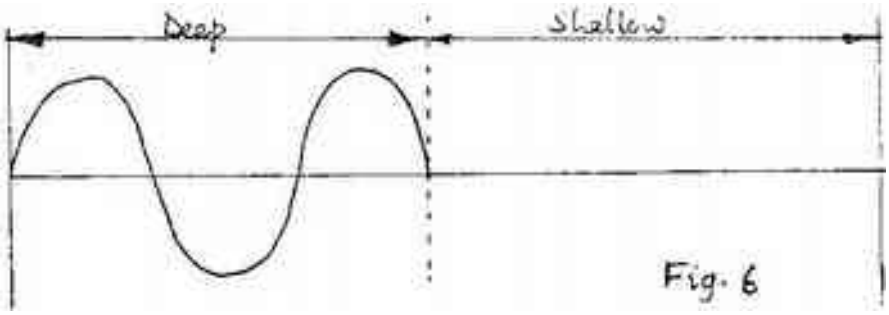
b) Figure 6 shows the displacement of a particle in a progressive wave incident on a boundary between deep and shallow regions.



i. Complete the diagram to show what is observed after boundary. (assume no loss of energy)

ii. Explain the observation in (i) above.

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(c) Water waves are observed as they pass a fixed point at a rate of 30 crests per minute. A particular wave crest takes 2s to travel between two fixed points 6m apart. Determine for the wave:

(a) The frequency (1 mark)

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(b) Wavelength (3 marks)

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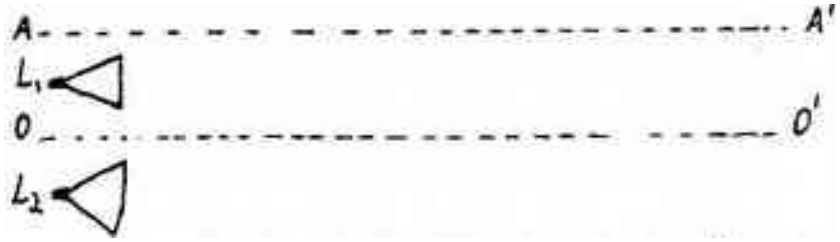
(d) Figure 7 shows two loud speakers L_1 and L_2 connected to a signal generator



One observer walks along line 00' and another line AA' for some distance. Describe the observations made by each observer and give reasons for your answer.

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7. 1998 Q2a P2

a) You are provided with two straight open tubes each about 1m long, a sound source, a sound detector and a reflecting surface. With the aid of a labelled diagram, describe an experiment to show that the angle of incidents is equal to reflection for sound waves.

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8. 1999 Q17 P1

Figure 12 shows how displacement varies with time as a wave passes a fixed point.

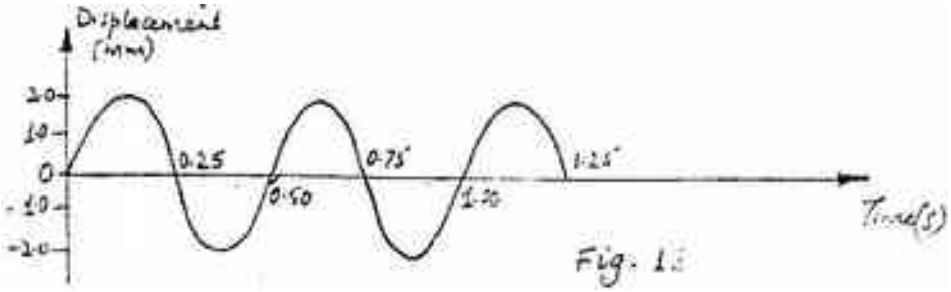

Fig. 1

Determine the frequency of the waves.

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9. 1999 Q1b, c P1

b) In the Young's double slit experiment, and interference pattern of bright and dark fridges was formed as shown in figure 1 by alight of wavelength coming from two narrow slits X and Y.

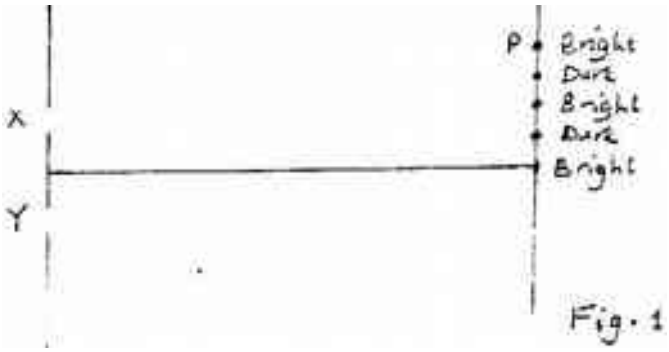

Fig. 1

i) Write an expression for the path difference between XP and YP where corresponds to the 2nd bright fringe.

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ii) Explain how the dark and bright fringes are formed.

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iii) State and explain what would be observed on the screen if the slits X and Y were made large.

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c) Figure 2 represents a displacement – time graph for a wave.

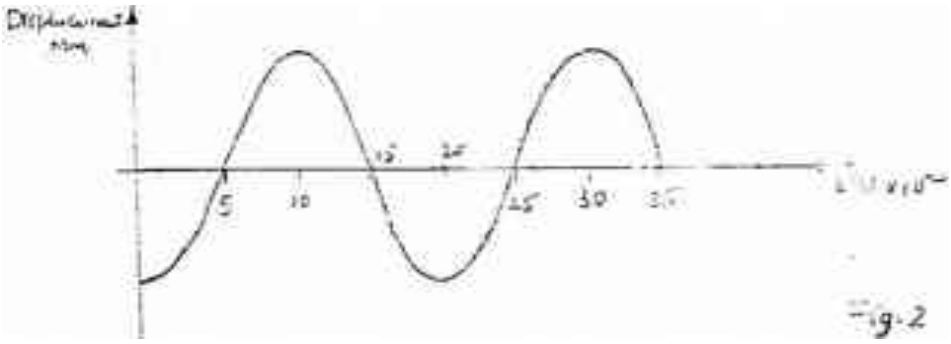

Fig. 2

i) Determined the frequency of the wave.

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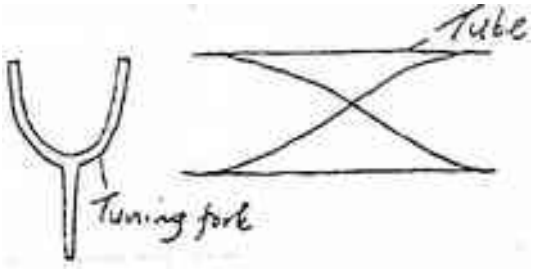
ii) Sketch on the same axes, the displacement – time graph of a wave of the same frequency but 180° out of phase and with a smaller amplitude.

10. 2000 Q28 P1

Fig 17 (a) shows the wave pattern at resonance in an open tube when a turning fork of frequency f_o is sounded near one end of the tube.



Sketch in **fig 17**(b) the pattern of the wave at resonance when a fork of frequency $3f_o$ is sounded near one end of an identical tube.

11. 2000 Q29 P1

State two uses of microwaves.

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12. 2000 Q6a, b P2

a) State the necessary conditions for interference to occur in waves

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b) **Fig 9**. Drawn to scale of 1: 200 shows two speakers L_1 and L_2 connected to a signal generator (not shown) producing sound waves of frequency 350Hz. An observer walking along PQ hears loud and low sounds at alternative positions.

(i) Explain how the observations made are caused

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(ii) At point O a loud sound is heard and at point A, the next loud sound is heard. Use this information and the diagram to determine the velocity of sound in air.

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(iii) State and explain the effect of increasing the frequency of the signal generator on the distance OA.

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13. 2001 Q16 P1

Fig 10. Shows water waves incident on a shallow region of the shape shown with dotted line.

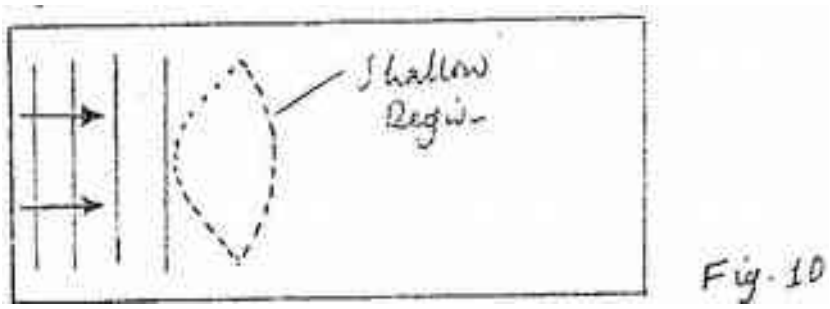
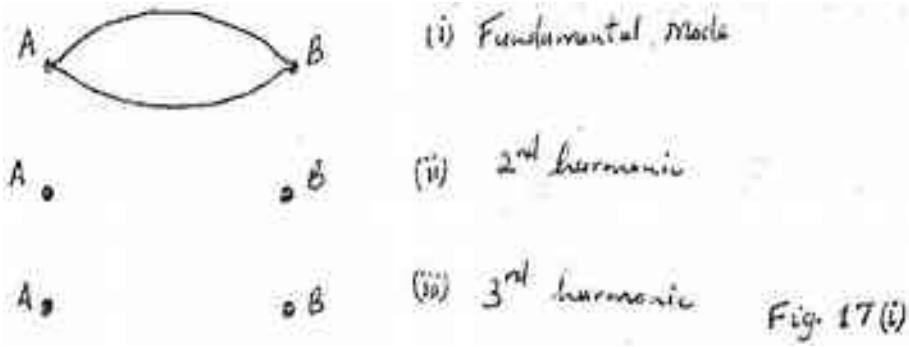


Fig. 10

On the same diagram, sketch the wave pattern in and beyond the shallow region.

14. 2001 Q25 P1

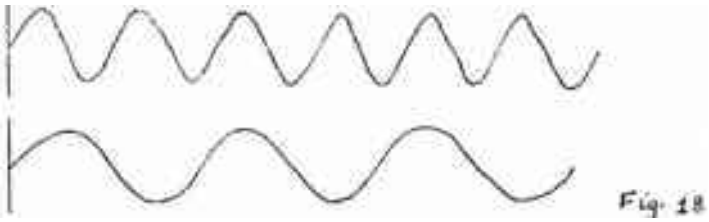
Fig. 17(i) shows a stretched string AB vibrating in its fundamental mode.
Figure 17(I)



Sketch in **fig 17**. (ii) and (ii) the 2nd and 3rd harmonic of the string respectively.

15. 2001 Q26 P1

Fig. 18 shows the wave patterns produced in one second when two tuning forks were sounded together.



Determine the beat frequency.

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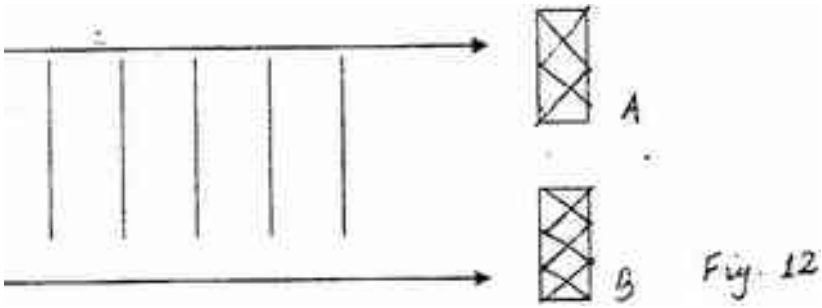
16. 2002 Q23 P1

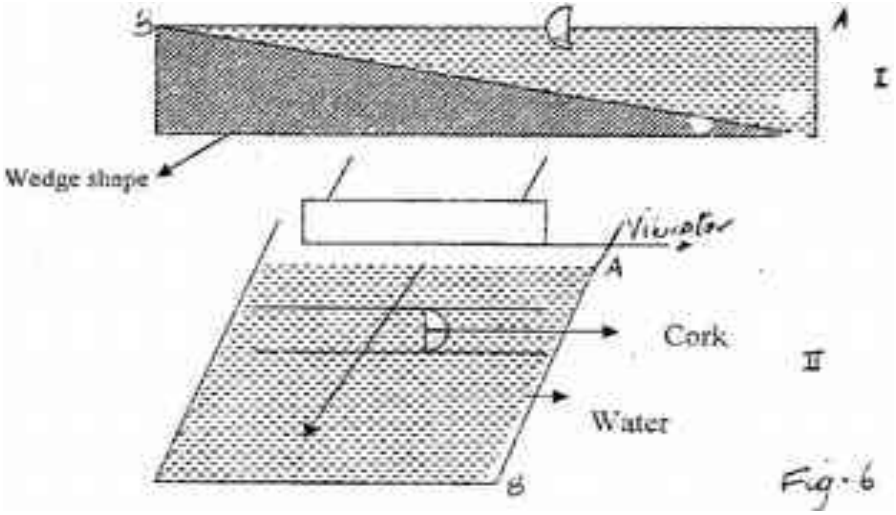
Fig. 12 shows water waves incident on an aperture AB.



On the same diagram, sketch the waves after going through the aperture.

17. 2002 Q5 P2

a) **Fig 6.1** shows the cross- section of a ripple tank full of water. A piece of cork floats on the surface of the water as shown. **Fig 6** II shows the water surface viewed from above. A straight edge vibrator placed at the end A of ripple tank generates water waves, which travel towards end B as shown.



(i) Identify the type of waves generated on the water surface.

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(ii) It is observed that as the waves pass the cork, there is no net movement on the cork. Explain this observation

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(iii) A student estimates that successive waves pass the cork every 0.20 seconds. If the speed of the waves is 0.30 ms^{-1}, determine the frequency and wavelength of the waves at that point.

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iv) In the space provided, sketch the wave fronts as viewed from a point above the ripple tank.

v) Explain the answer in part (iv) above

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b) A tuning fork is sounded at the mouth of a pipe whose one end is closed with a moveable piston. Resonance is observed successively when the piston is 77cm and then at 129 cm. If the speed of sound in air is 340ms $^{-1}$, determine the frequency of the tuning fork.

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18. 2003 Q4 P2

a) Figure 3 shows a transverse wave travelling along x-axis.

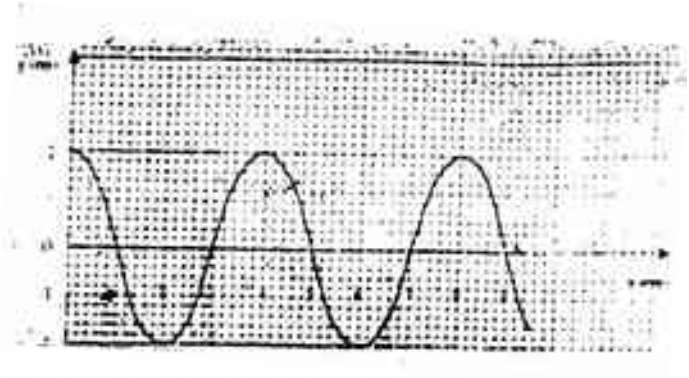

Fig 3

(i) Determine the:

I Wavelength of the wave

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II Amplitude of the wave.

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(ii) If the time taken by the wave to move from 0 to A is 0.09 seconds, determine the:

I Frequency of the wave.

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II Speed of the wave

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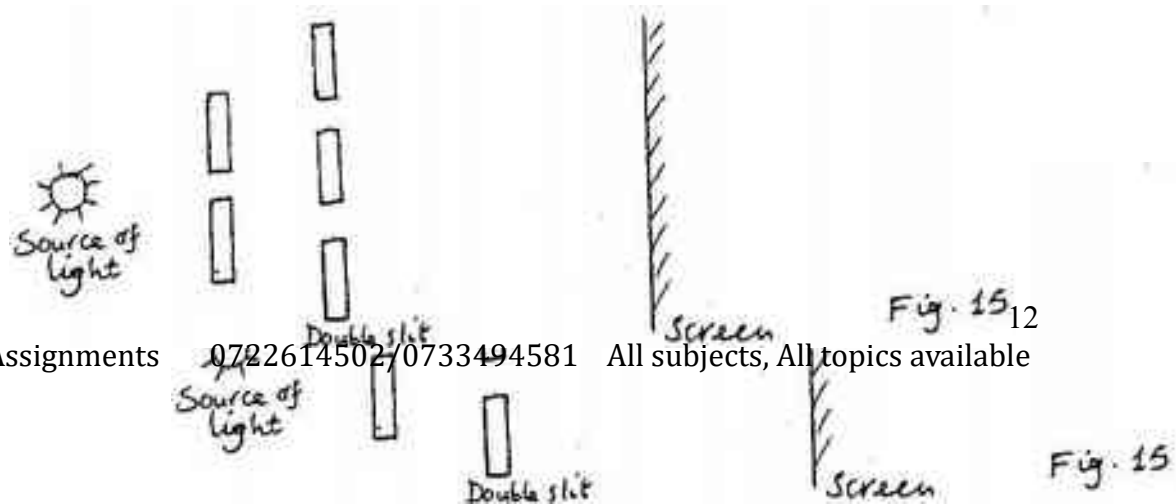
19. 2003 Q27 P1

Figure 15 shows an experimental arrangement for determining the wavelength of light,



State and explain the difference in the patterns observed on the screen other than the difference in colour when the source of red light is replaced by a source of violet light.

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20. 2004 Q30 P1

Fig. 15 shows water waves of different wavelengths in identical apertures A and B.

Fig 15

Complete the diagram to show the pattern of the waves beyond the aperture in each case.

21. 2004 Q4a P2

a) Fig 5 shows the displacement time graph of a wave travelling at 200cm/s

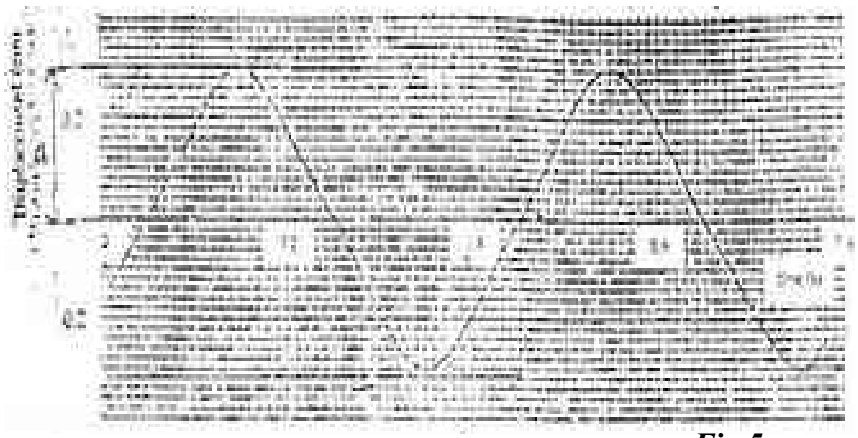

Fig 5

Determine for the wave the

i) Amplitude

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ii) Period

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iii) Frequency

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iv) Wavelength

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22. 2005 Q16 P1

Fig 10 represents a transverse wave of frequency 5 Hz travelling in the x direction.

displacement

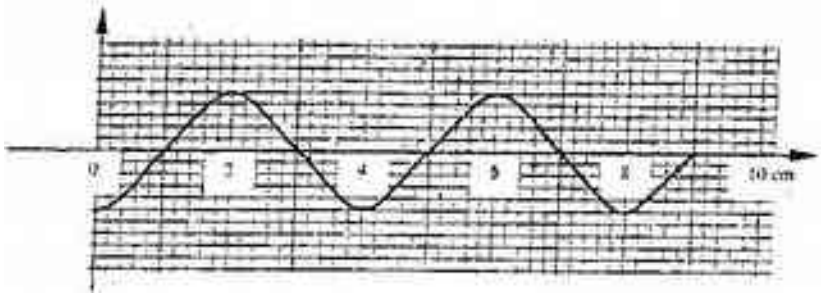

Fig 10

Determine the speed of the wave. (3 marks)

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23. 2005 Q32 P1

Fig 16 shows wave fronts in a ripple tank approaching a shallow region in the tank.

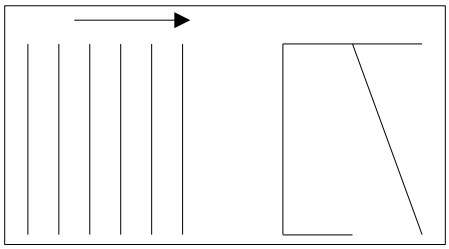

Figure 16

Complete the diagram to show the wave front as they pass over the shallow region and after leaving the regions. (1 mark)

24. 2006 Q7 P2

Figure 5 shows wave fronts approaching a concave surface

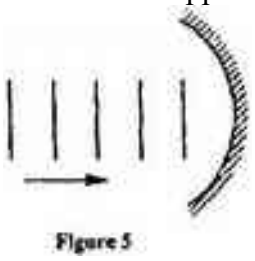

Figure 5

Complete the diagram to show the wave fronts formed after striking the surface. Show how the focal point of the surface is located (2 marks)

25. 2007 Q5 P2

Figure 4. Shows the displacement – time graph for a certain wave

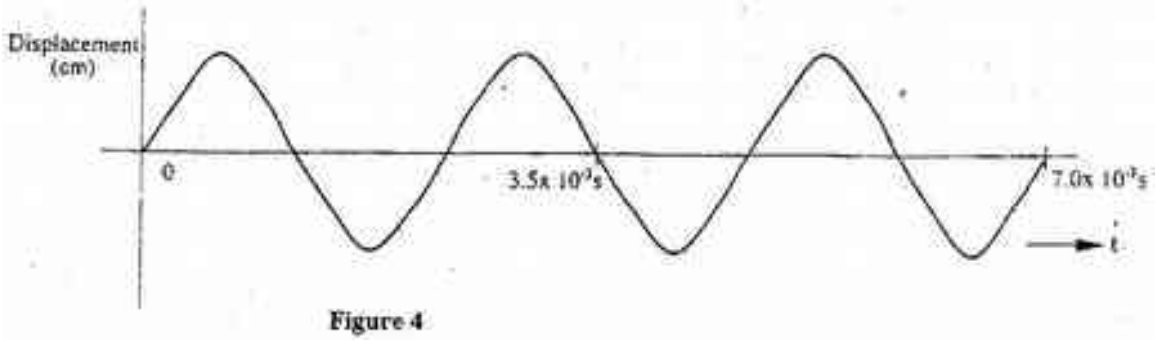

Figure 4

Determine the frequency of the wave (3 marks)

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26. 2007 Q6 P2

Figure 5 (a) and (b), show wave fronts incident on barriers blocking part of the path.

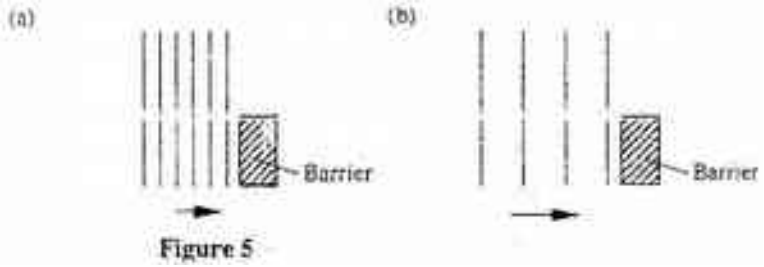

Figure 5

On the same figures sketch the wave fronts to show the behaviour of the waves as they pass each barrier and after passing the barrier. (1 mark)

27. 2008 Q8 P2

Figure 5 shows wave fronts approaching the boundary between two media.

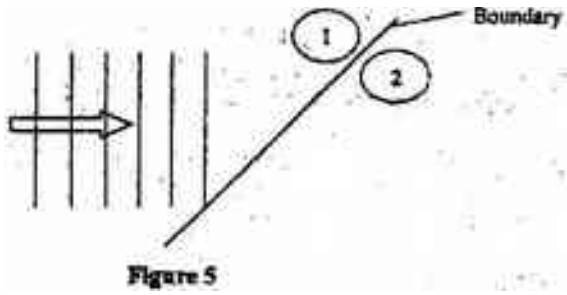

Figure 5

The speed of the waves in medium (2) is higher than that in medium (1). On the same diagram complete the figure to show the wave fronts after crossing the boundary. (2 marks)

28. 2009 Q19 P2

Figure 12 shows a set up for observing interference of waves from two sources S_1 and S_2 the point C and D represent position of the constructive and destructive interference respectively as observed on the screen.

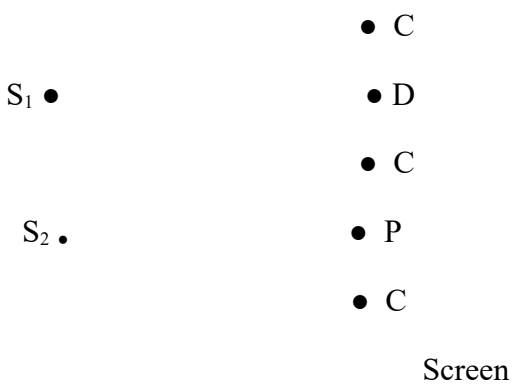

Fig 12

(a) (i) If the observation was made in ripple tank describe:

(i) How the constructive and destructive interferences are identified. (1mark)

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(ii) Explain how the constructive interference C and the destructive interference D patterns produced (2marks)

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(b) Draw

(i)The line joining all points where waves S_1 and S_2 have travelled equal distance. Label it A (1mark)

(ii)The line joining all points where wave from S have traveled one wavelength further than the waves from S label it B (1 mark)

29. 2010 Q8 P2

A water wave of wavelength 18 mm is incident on a boundary of shallow water at right angles. If the wavelength in the shallow end is 14.4 mm, determine the refractive index of water for a wave moving from the deep to the shallow end.

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30. 2010 Q13 P2

The wavelength of a radio wave is 1km. Determine its frequency. (Take the speed of light as 3.0×10^8 ms"[1])

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31. 2012 Q14 P2

a) **Figure 12**, shows a displacement –time graph for a progressive wave.

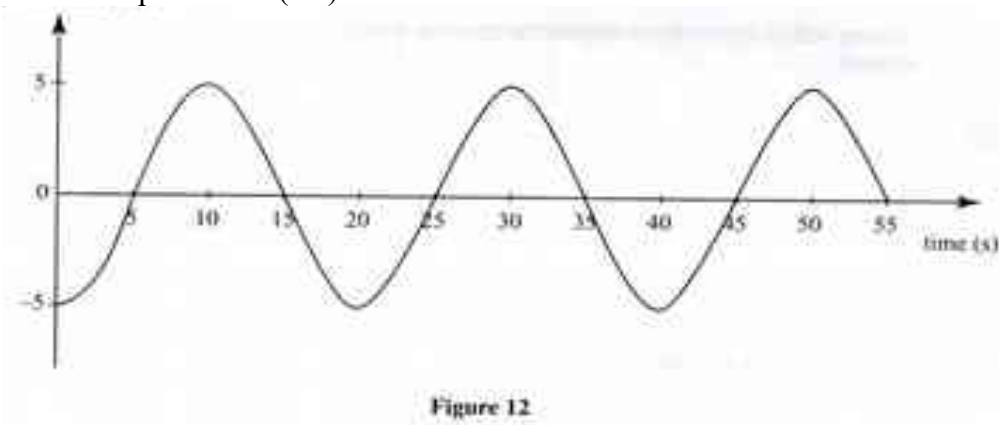

Figure 12

i. State the amplitude of the wave (1 mark)

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ii. Determine the frequency of the wave (4 marks)

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iii. Given that the velocity of the wave is 20^{ms-1}, determine its wavelength (3 marks)

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b) **Figure 13** shows two identical dippers A and B vibrating in water in phase with each other. The dippers have the same constant frequency and amplitude. The waves produced are observed along line MN;

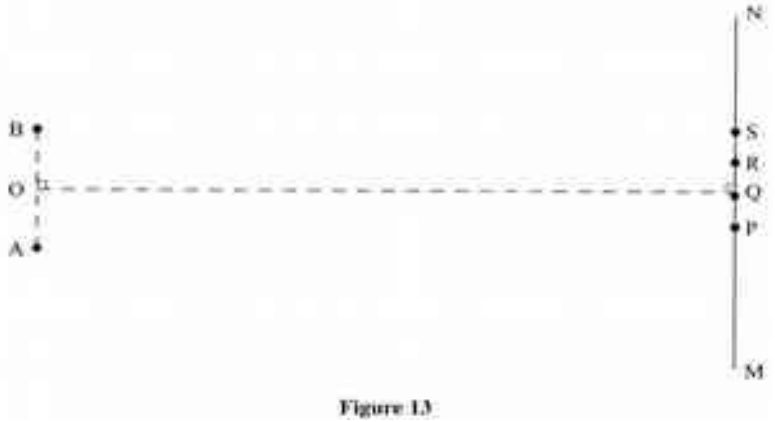

Figure 13

It is observed that the amplitudes are maximum at points Q and S, and minimum at points P and Q.

i. Explain why the amplitude in maximum at Q. (2 marks)

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ii. State why the amplitude is minimum at R. (1 mark)

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iii. State what would happen if the two dippers had different frequencies (1 mark)

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