

# Sylhet Board 2016

Physics

Subject Code 136

Time — 2 hours 10 minutes

Creative Essay Type

Full marks — 40

[N.B. -The figures in the right margin indicate full marks. Answer any four Questions.]

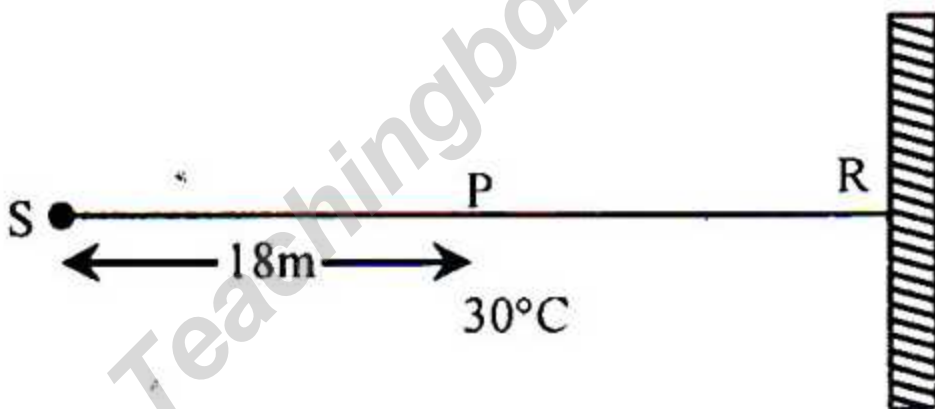
1 ► An electric motor of power 15 kW can lift 1000 kg water on a roof of height 300 m in 0.5 minute.

- What is called potential energy? 1
- Distinguish between transverse wave and longitudinal wave. 2
- Calculate the efficiency of the motor. 3
- Analyze mathematically the amount of energy used by the motor within that time if the efficiency is 75%. 4

2. ★ A cricket ball is thrown vertically upward by Mukul with an initial velocity  $20\text{ms}^{-1}$ . At the same time Nishan tried to catch the ball coming with a uniform velocity of  $6\text{ms}^{-1}$  from 30m away.

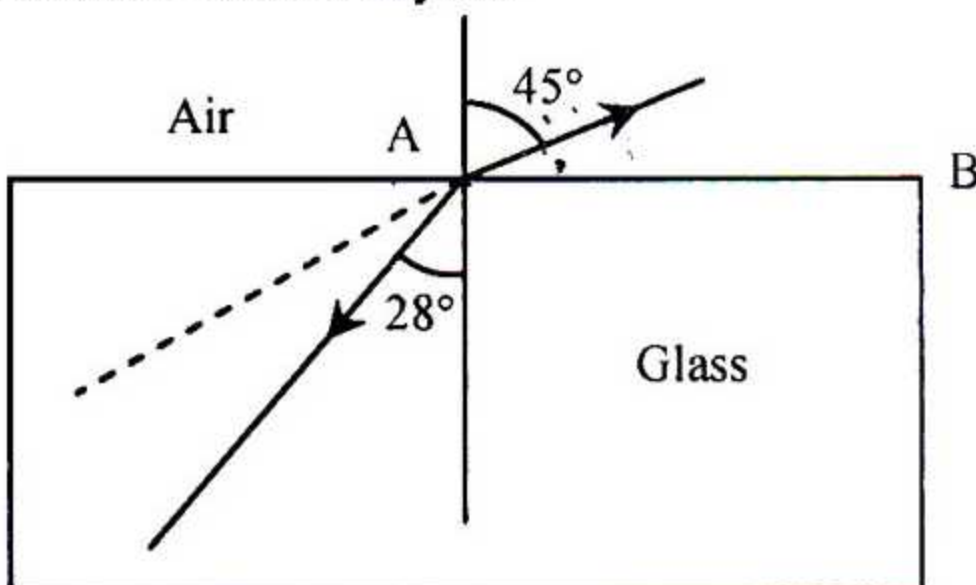
- What is called pitch? 1
- Power is a derived quantity—Explain. 2
- Find out the maximum height of the ball. 3
- Is it possible for Nishan to catch the ball before dropped on earth? Give your opinion with mathematical analysis. 4

3. ►



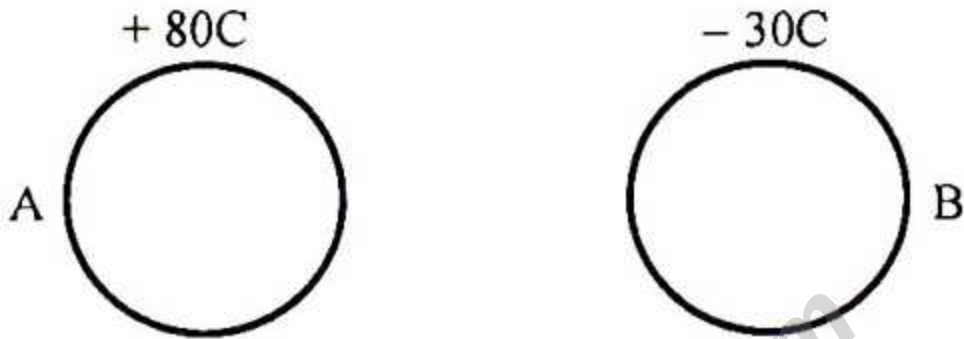
- What is called echo? 1
- Explain the role of friction in the smoothness of road. 2
- Find out the distance between S and R. 3
- Is it possible to hear the echo at position P? Give opinion with mathematical analysis. 4

4. ►



- Write Snell's law. 1
- What is meant by the specific heat of silver is  $230\text{J kg}^{-1}\text{K}^{-1}$ ? 2
- Determine the velocity of light in glass medium. 3
- What amount of angle of incidence will be changed if the light has to come towards AB? Analyze mathematically drawing the ray diagram. 4

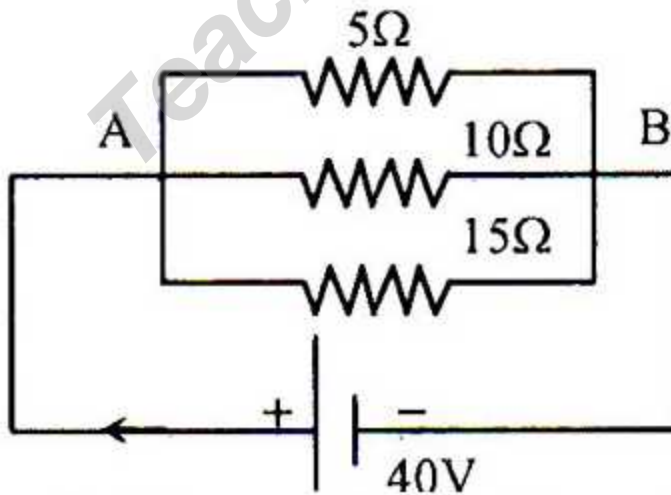
5. ►



Two metal balls A and B of the same size and same material is placed at a distance of 15 cm.

- What is called electric induction? 1
- What is meant by 1 C charge? 2
- Determine the force acting between A and B. 3
- If A and B are connected by a metal wire, then what will happen to the force? Explain mathematically. 4

6. ★



- What is called the specific resistance? 1
- How does electron gun work in television? 2
- Calculate the equivalent resistance of the circuit. 3
- The potential difference between two sides of the resistances are same but the amount of current is different in each resistance—Analyze mathematically. 4

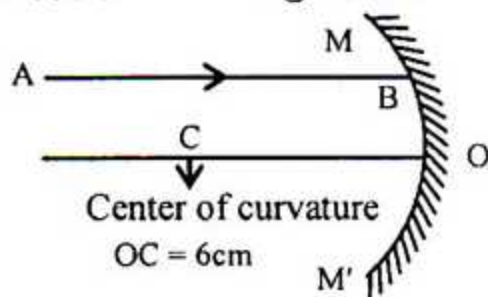
[Fill the circle completely (●) with the correct or most appropriate answer, corresponding to the question number. Make sure to use a ball point pen. Each question carries 1 mark.]

1. Which one is unit of modulus of elasticity?

- (a) Nm (b)  $\text{Nm}^{-2}$   
(c)  $\text{Nm}^{-1}$  (d)  $\text{N}^{-1}\text{m}^{-1}$

2.  $40^\circ\text{C}$  temperature equals to what reading in Fahrenheit scale?

- (a)  $40^\circ\text{F}$  (b)  $72^\circ\text{F}$   
(c)  $104^\circ\text{F}$  (d)  $313^\circ\text{F}$



On the basis of the above stem answer questions number 3–5 :—

3. What is the distance of reflected ray passes from the pole of AB incident ray?

- (a) 2 cm (b) 3 cm  
(c) 6 cm (d) 12 cm

4. What is the angle of reflection of CB incident ray?

- (a)  $0^\circ$  (b)  $30^\circ$   
(c)  $45^\circ$  (d)  $60^\circ$

5. To get erect image, the distance of the object from pole will be—

- i. 2 cm ii. 3 cm  
iii. 4 cm

Which one is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

6. which device is used to determine the density?

- (a) Barometer (b) Hydrometer  
(c) Speedometer (d) Voltmeter

7. Which point the value of pressure depends in liquid?

- i. Density of the liquid  
ii. Quantity of the liquid  
iii. Depth of the liquid

Which one of the following is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

8. Which one of the following is a fundamental quantity?

- (a) Electric potential  
(b) Temperature  
(c) Weight  
(d) Mass

9. Which one is relates to Newton's 1st Law of motion?

- (a)  $V = U + at$   
(b)  $U = V$   
(c)  $S = Vt$   
(d)  $F = ma$

10. What will happen to the value of resistance of a conductor when its cross-sectional area is reduced to half?

- (a) Increases 2 times  
(b) Decreases 2 times

- (c) Increases  $\frac{1}{2}$  time

- (d) Decreases  $\frac{1}{2}$  time

11. Which one of the following is product of force and velocity?

- (a) Work (b) Energy  
(c) Power (d) Momentum

12. In a photocopier machine, the reflected light centers on which of the following?

- (a) Toner  
(b) Roller  
(c) Drum  
(d) Printed part of paper

13. Under  $10^\circ\text{C}$  temperature the velocity of sound is  $338 \text{ ms}^{-1}$ . What is the velocity of sound in vacuum when temperature is  $30^\circ\text{C}$ ?

- (a)  $1014 \text{ ms}^{-1}$  (b)  $350 \text{ ms}^{-1}$   
(c)  $332 \text{ ms}^{-1}$  (d)  $0 \text{ ms}^{-1}$

14. At what temperature, the velocity of sound increases three times?

- (a)  $996^\circ\text{C}$  (b)  $1107^\circ\text{C}$   
(c)  $1328^\circ\text{C}$  (d)  $1660^\circ\text{C}$

Using the faultless slide calipers while measuring length of a bar, main scale and Vernier scale reading was found 5 division and 16 division respectively. 1 small division of main scale is 0.5 mm and 20 Vernier scale division equals to 19 smallest main scale division.

On the basis of the above stem answer questions number 15 and 16 :—

15. How much is the Vernier constant?

- (a) 0.1 mm (b) 0.025 mm  
(c) 0.026 mm (d) 0.25 mm

16. With the help of instrument of the above stem—

- i. length of bar is measured 5.4 mm  
ii. length of bar is measured 2.9 mm  
iii. minimum length of 0.025 mm can be measured

Which one is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

17. Which of the following transformation first occurs in optical fibre?

- (a) Electrical signals to light signals  
(b) Light signals to electrical signals  
(c) Electrical signals to sound signals  
(d) Sound signals to electrical signals

18. The inception of modern scientific method was made by which of the following scientists?

- (a) Newton (b) Galileo  
(c) Robert Hook (d) Huygen

19. If a freely falling body covers 72 m in 6s, what distance it will cover in 3s?

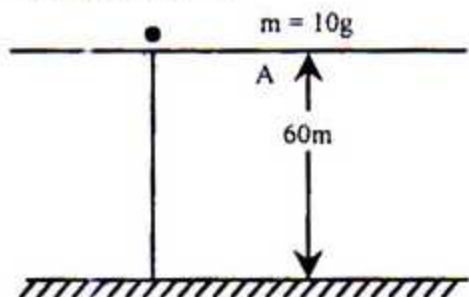
- (a) 36 m (b) 24 m  
(c) 18 m (d) 8 m

20. What is the speed of  $\gamma$  ray?

- (a)  $3 \times 10^8 \text{ms}^{-1}$  (b)  $1.67 \times 10^{19} \text{ms}^{-1}$   
(c)  $3.2 \times 10^{19} \text{ms}^{-1}$  (d)  $9.11 \times 10^{19} \text{ms}^{-1}$

21. What type of radioactive isotope is used in blood Leukaemia?

- (a) Co-60  
(b) Iodine-131  
(c) Technetium-99m  
(d) Phosphorus-32



On the basis of the above stem answer questions number 22 and 23 :—

22. What is the height of potential energy which is five times kinetic energy from the earth surface?

- (a) 19.6m (b) 48.8m  
(c) 49m (d) 50m

23. What is the momentum of a body after 3s?

- (a) .0294kgms<sup>-1</sup> (b) .294kgms<sup>-1</sup>  
(c) 2.94kgms<sup>-1</sup>  
(d) 29.4kgms<sup>-1</sup>

In a house daily two rice cooker 484W and two water heater 605W of 220V are used 5 hours.

On the basis of the above stem answer questions number 24 and 25 :—

24. Find the cost unit per day.

- (a) 2.178 (b) 5.445  
(c) 21.78 (d) 54.45

\* Note: If the power of two rice cookers and two water heaters is considered the answer will be 10.89 unit.

25. Circuit of stem—

- i. The current is flow 9.9A  
ii. The fuse is suitable of 12A  
iii. Equivalent resistance is 22.22 $\Omega$   
Which one of the following is correct?

- (a) i & ii (b) ii & iii  
(c) i & iii (d) i, ii & iii

26. The value of two vectors are 7m and 5m. The sum of two vectors—

- i. zero  
ii. 2m  
iii. 12m

Which one of the following is correct?

- (a) i (b) ii  
(c) iii (d) ii & iii

27. ★ Define the relation between two bodies of +10C and - 10C?

- (a) Electromagnetic force  
(b) Magnetic force  
(c) Weak nuclear force  
(d) Strong nuclear force

28. Which is unit of Coloumb's constant?

- (a)  $\text{N}^{-1}\text{m}^2\text{c}^2$  (b)  $\text{Nm}^{-2}\text{c}^2$   
(c)  $\text{Nm}^2\text{c}^2$  (d)  $\text{N}^{-1}\text{m}^{-2}\text{c}^{-2}$

29. Which is correct relation between kinetic energy and momentum?

- (a)  $E_k = \frac{P}{2m}$  (b)  $E_k = \frac{2P}{m}$   
(c)  $E_k = \frac{P^2}{2m}$  (d)  $E_k = \frac{2P^2}{m}$

30. ★ Which one is used in the turns of hilly road?

- (a) Plane mirror  
(b) Concave mirror  
(c) Convex mirror  
(d) Concave lens

31. Which one of the objects added to convert of p-type semiconductor?

- (a) Phosphorus  
(b) Carbon  
(c) Boron  
(d) Nitrogen

32. In the equation  $E = mc^2$ , m is—

- (a) Mass of nucleus  
(b) Lost mass of nucleus  
(c) Atomic mass  
(d) Mass of uranium

33. ★ If a mirror produces virtual image, what type of mirror it is?

- i. plane ii. concave  
iii. convex

Which one is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

34. Which one of the following is the form of energy converting in an electric motor?

- (a) Heat energy  $\rightarrow$  Electrical energy  
(b) Heat energy  $\rightarrow$  Mechanical energy  
(c) Electrical energy  $\rightarrow$  Mechanical energy  
(d) Mechanical energy  $\rightarrow$  Electrical energy

35. ★ The meaning power of lens is increased—

- i. power converging or diversing are so much  
ii. length of focus is low  
iii. the curve of radius is high

Which one of the following is correct?

- (a) i & ii (b) i & iii  
(c) ii & iii (d) i, ii & iii

Ans.	1	(b)	2	(c)	3	(b)	4	(a)	5	(a)	6	(b)	7	(b)	8	(d)	9	(b)	10	(a)	11	(c)	12	(c)	13	(d)	14	(d)	15	(b)	16	(c)	17	(a)	18	(b)	19	(c)	20	(a)
	21	(d)	22	(d)	23	(b)	24	*	25	(d)	26	(d)	27	(a)	28	(b)	29	(c)	30	(a)	31	(c)	32	(b)	33	(b)	34	(c)	35	(a)										