MARKING GUIDE

PHYSICS

S6

23rd/03/2026

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1. a) Displacement
   b) Restoring force
   c) Velocity
   d) Amplitude

2. a) iii
   b) ii
   c) i and ii
   d) iv

3. a) False
   b) True
   c) True
   d) False

4. a) Light Amplification by Stimulated Emission of Radiation (that expression means that the light is formed by stimulating a material's electrons to give out the laser light or radiation)

   b) i) Coherence
      - Collimation

   ii) Can damage eyes or skin

5. A. False
   B. True
   C. False
   D. False

6. a)

Quark	Electric charge	Spin
Uud	+1	1/2
Udd	0	1/2

b) Baryons

7. a) Half duplex
b) Mobile phone digital system
c) Analog system

8. a) i) Main sequence (Central diagonal)
ii) Lower left region
iii) Upper right region
iv) top right extreme

b) i) luminosity: total energy emitted per second by a star
ii) Absolute magnitude: Brightness of a star

9. a → ii
b → v
c → iv
d → iii
e → i

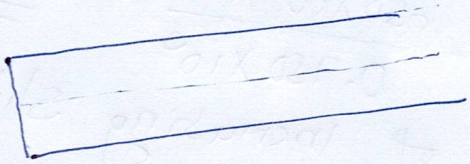
10. I. A
II. A
III. A
IV. C
V) C
VI) D
VII) F
VIII) B
IX) A
X) C
XII) B

11. A. ii and iv
B. i
C. i) Loudness
ii) Echoes
iii) Sound quality

D. A: Microphone (transducer)
B: Oscillator (mixer)
C: Audio frequency (input signal)
D: Radio frequency
E: Antenna
F: Amplifier

E. 1. true
2. b) A and E
3. a)

b)



SECTION B

Q. i) Three Conditions for interference
- Waves must be coherent (Constant phase difference)
- Waves must have the same frequency (wavelength)
- Waves must have nearly equal amplitudes.

ii) Principle of superposition:
When two or more ~~heat~~ waves meet, the resultant displacement at any point equals the algebraic sum of individual displacements.

b)

Point	Constructive interference	Destructive interference	Neither
X		✓	
Y	✓		
Z		✓	

c. i) Constructive interference occurs when path difference $= n\lambda$ — A or F, B

ii) Destructive interference occurs when path difference $= \left(n+\frac{1}{2}\right)\lambda$ (A, C, E, G)

d) i) $\lambda = 650\text{nm} = 650\times10^{-9}\text{m}$

$D = 1.2\text{m}$

β (fringe separation) $= 0.750\text{mm} = 0.750\times10^{-3}\text{m}$

$\beta = \frac{\lambda D}{d}$, $d = \frac{\lambda D}{\beta}$

$d = \frac{650\times10^{-9}\times1.2}{0.750\times10^{-3}} = 1.04\times10^{-3}\text{m}$

ii) Effect of increasing slit separation
- fringe separation → decreases
- frequency → No change

(2) I a) Increase intensity
. Increase tube current (more electrons per second)

b) Increase anode voltage.

II a) $Q = It$

$Q = 0.015\text{C}$

b) $Q = ne$

$n = \frac{0.015}{1.6\times10^{-19}} = 9.38\times10^{16}$ electrons/s

III. $eV = \frac{1}{2}mv^2$

$v = \sqrt{\frac{2eV}{m}} = \sqrt{\frac{2\times1.6\times10^{-19}\times10\times10^{3}}{9.1\times10^{-31}}}$

$= 5.9\times10^{7}\text{m/s}$

IV) Medical imaging, cancer treatment, ----

(3) a) process WX and YZ

b) the temperature at Y is given by

$$\frac{P_X V_X}{T_X} = \frac{P_Y V_Y}{T_Y}$$

$$T_Y = \frac{5.2 \times 10^5 \times 0.44 \times 10^{-3}}{1.0 \times 10^5 \times 1.42 \times 10^{-3}} \times 310 = 499\,K$$

c. $W = 610\,J$

i) Area WXYZ represent Work done by Engine

ii) $\eta = \frac{W}{Q} = \frac{610}{1.3 \times 10^3} \times 100 = 47\%$

d) Addiabatic process ($\Delta Q = 0$)

$$\Delta U = \Delta Q + \Delta W$$

$$\Delta U = \Delta W = 210\,J$$

(4) A. I) b

II) c

III) b

IV) d

B. a) $E_n = -\frac{13.6\,eV}{n^2} = -\frac{13.6 \times 1.6 \times 10^{-19}}{36} = -6.05 \times 10^{-20}\,J$

b) $\frac{1}{\lambda} = R\left(\frac{1}{3^2} - \frac{1}{4^2}\right) = 1.87 \times 10^{-6}\,m$

c) $r_n = a_0 n^2$

$= 36 \times 5.29 \times 10^{-11}\,m = 1.9 \times 10^{-9}\,m$

(5) i) a

ii) d

iii) c

iv) d

v) b

vi) A. Computed Tomography (CT

B. Stomach

C. MRI

d. photomultiplier tube

e. Depth / age

f. Campass Riddle

g. Nuclear Magnetic Resonance

H. Expensive