## INDIAN SCHOOL MUSCAT

## FINAL TERM EXAMINATION

### **NOVEMBER 2018**

**SET B** 

#### **CLASS XII**

# Marking Scheme – PHYSICS [THEORY]

Q.NO.	Answers	Marks (with split up)
1.	50 Hz ( with calculation)	1
2.	Longer wavelength scattered least	1
3.	5V	1
	OR	
	1.5 eV	
4.	Ratio 1:1 because nuclear density is independent of mass number	1
5.	i) Spherical (ii) plane	1/2 , 1/2
	OR	
	Width of slit less than or equal to wavelength of light used	1
6.	Derivation of $v_d = -(e\tau/m)E$ OR	2
	Graph resistivity vs temperature semiconductor	1
	With the rise of temperature of semiconductor, number density of free electrons increase and hence resistivity decreases	1
7.	Part AB represents repulsive force and Part BCD represents attractive force.  Repulsive  B  Attractive  C 1 2 3 4  r (fm)	1

	Any two charactertics of nuclear force	1/2 , 1/2
	OR	
	Definition of Activity	1/2
	SI unit- Becquerel(= 1 disintegration/second)	1/2
	$N_0$	1
8.	Derivation :	
	$r = (m^2h^2\epsilon_0)/\pi me^2$	1
	$r \alpha n^2$	1
9.	(i) X-rays / Gamma rays – anyone and their one use	1
	(ii) Infrared/Visible rays/Microwaves- any one and their one use	1
10.	Derivation of Kinetic energy = $e\lambda/4\pi\epsilon_0$	2
11.	Electric potential due to electric dipole at axial point:- Diagram	1½ 1½
12.	Derivation: $V = k p/r^2$ $V_d = V/(ne\rho l)$	
14.	(i) when D is halved the drift velocity remains unchanged	1
	(ii) when <i>l</i> is doubled the drift velocity is halved	1

13.	) Graphical variation of (BE/A) for nucleons with mass number A .	
	The variation of binding energy per nucleon versus mass number is shown in figure	11/2
	8 0 0 12 Fe <sup>56</sup>	
	Holleria John	
	⊕ ⊆ 6.0	
	§ 5.0 Li <sup>7</sup>	
	9 4.0	
	7.0 N/3 6.0 Li <sup>7</sup> 4.0 3.0 3.0 H <sup>2</sup> 1.0 H <sup>2</sup>	
	E 2.0	
	g 1.0 H <sup>2</sup>	
	0.0 20 40 60 80 100 120 140 160 180 200 220 240	
	Mass Number-	
	Three main inferences from graph	11/2
14.		1/
	$\mathbf{U} = \mathbf{W}_1 + \mathbf{W}_2 + \mathbf{W}_3$	1/2
	U = -0.630 J (with expression and calculation)	2
	Work done to dissociate the system of charges $= +0.630 \text{ J}$	1/2
	OR	
	$U_1 = 12 \times 10^{-6} J$	1/2
	Common potential = 100 V	1
	$U_2 = 6 \times 10^{-6} J$	
	F 10-6 I	1
	Energy lost = $6 \times 10^{-6} \text{ J}$	1/2
15.	Total current in potentiometer wire	
	I = 2.0/(15 + 10)	
	= 2/25  A	1/2
	PD across the wire = $(2/25) \times 10 = 0.8 \text{ V}$	
	Potential gradient $k = 0.8/1.0$	1
	= 0.8  V/m Current flowing in the circuit containing experimental cell	1
	= 1.5/(1.2 + 0.5)	
	= 1 A	1/2 ,
	PD across $AO = 0.3 \times 1 = 0.3 \text{ V}$	1/2

	Length AO = $(0.3/0.8)$ m = 37.5 cm	1/2
16.	Verification of laws of refraction by Huygens' principle:	
	Diagram showing incident and refracted wavefront	1
	verification	2
17.	Derivation of equivalent emf and equivalent internal resistance	
	$E = (E_1 r_2 + E_2 r_1) / r_1 + r_2$	2
	$R_{eq} = r_1 r_2 / r_1 + r_2$	1
18.	AC Generator:	
	Working principle	1/2
	Diagram	1
	Derivation for alternating emf	11/2
	OR	
	Transformer:	1/
	Diagram Working	1½ 1½
	Derivation of expression	1
19.	Diagram of the magnetic lines for diamagnetic and paramagnetic substances	1/2 + 1/2
	Explanation of magnetic behavior of both the materials	1 +1
20.	(i) $X_L = 100 \Omega$	1/2
	$X_C = 500 \Omega$	1/2
	$Tan\phi = -1$	
	$\Phi = -\pi/4$	1/2
	Hence current leads voltage	
	(ii) to make power factor unity	
	$X_{L} = X_{C}$	
	$(1/\omega C') = 100$	
	<u>I</u>	

	$C' = 10 \mu F$	1
	$C' = C + C_1$	
	$10 = 2 + C_1$	
	$C_1 = 8\mu F$	1/2
21.	Derivation of photoelectric equation	2
	Explanation why wave theory of light is not able to explain photoelectric effect	1/2 , 1/2
	OR	
	Equations and calculation	
	$\lambda_{\alpha}/\lambda_{\rm p} = 1/2\sqrt{2}$	1 +1
		1
22.	For $L_1$ $V_1 = 40 \text{ cm}$	1
	For L <sub>2</sub>	
	Image formed by $L_1$ at the focus of $L_2$ so after refraction from $L_2$ light become parallel	
	Distance between $L_1$ and $L_2 = 60$ cm	1
	For $L_3$ Image formed at focus so incident light on $L_3$ should be parallel	1
	Distance between $L_2$ and $L_3$ can have any value	
23.	(i) High permeability, Low coercivity and Low retentivity (any two)	1/2 ,1/2
	(ii) $B_H = 2 B$ (with calculation)	2
24.	Derivation of Lens maker's formula:	
	Ray diagram	1
	Derivation	2
	OR	
	Diffraction through single slit:	
	Ray diagram	1
	Condition and explanation of secondary minima	2
	I	1

25.	(i) Derivation:	
23.		
	Current lags behind applied voltage	
	(ii) Definition of inductive reactance	
	Graph between $X_L$ and f	
	OR OR	
	i) Derivation:	
	Current leads the applied voltage	
	(ii) Definition of capacitive reactance	
	Graph between $X_C$ and $f$	
26.	(i) Optical fiber: working with diagram	1+1
	(ii) Derivation of refractive index formula for prism:	
	Ray diagram	1
	Derivation	2
	OR	
	(i) Definition of coherent sources	1
	Two conditions of sustained interference	1/2 , 1/2
	(ii) Young's double slit experiment;	
	Diagram	1
	Derivation of fringe width	2
27.	Definition of electric dipole moment	1/2
	S I unit- C-m	1/2
	Derivation:	
	Force acting on it	1/2
	Expression of Torque acting on electric dipole	11/2
	OR	
	Derivation:	
	energy stored in parallel plate capacitor	3
	energy density	2