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SeniorSecondary School ,Term II Examination2022

Marking Scheme – PHYSICS (SUBJECT CODE — 042)

(PAPER CODE — 55/3/1)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **“Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its’ leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC.”**
3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one’s own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark($\checkmark$) wherever answer is correct. For wrong answer ‘X’ be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 35 (example 0-40 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.

11. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 30 answer books per day in main subjects and 35 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
 - Leaving answer or part thereof un assessed in an answer book.
 - Giving more marks for an answer than assigned to it.
 - Wrong totalling of marks awarded on a reply.
 - Wrong transfer of marks from the inside pages of the answer book to the title page.
 - Wrong question wise totalling on the title page.
 - Wrong totalling of marks of the two columns on the title page.
 - Wrong grand total.
 - Marks in words and figures not tallying.
 - Wrong transfer of marks from the answer book to online award list.
 - Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
 - Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0) Marks.
14. Any un assessed portion, non-carrying over of marks to the title page, or totalling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.
16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totalled and written in figures and words.
17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

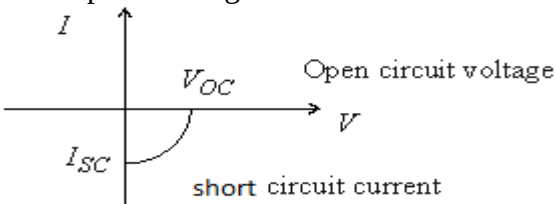
Senior Secondary School Examination TERM-II, 2022

PHYSICS (Subject Code — 042)

[Paper Code — 55/3/1]

Maximum Marks : 35

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total marks
	SECTION—A		
1.	Meaning of doping1 Two types of atom1 Doping is the process of adding some external impurity atoms in an intrinsic semiconductor to increase its conductivity. Dopant atoms may be pentavalent or trivalent.	1 ½+½	2
2.	a) Distinction between isotopes and isobars1 Explanation1 (i) Isotopes – These are the atoms having same atomic number (Z) but different atomic mass(A). Isobars – The atoms of different element having same atomic masses. (ii) No the mass number of a nucleus is the sum of number of proton(Z) and number of neutrons (N) / $A = Z + N$ / Two nuclei with different mass numbers A_1 and A_2, may have, have different Z . OR b) Two factors1 Definition of threshold frequency1 (i) Factors (a) Frequency of incident radiation (b) Work function of the surface (ii) The minimum frequency of the incident radiation below which photoelectric emission does not take place.	½ ½ ½ ½	2 2
3.	Explanation of movement of charge carriers / diffusion1 Formation of the barrier potential1 The diffusion of electrons from n-region to p-region and that of the holes from p-region to n-region creates positive charge on the n-side and negative charge on the p-side which causes a difference of potential across the junction. This potential, setup across the junction tends to prevent the movement of electrons from the n-region to p-region .This is called barrier potential.	1 1	2

	SECTION—B		
4.	Statement of Bohr's 2nd postulate 1 Derivation of speed 2 (i) An electron can revolve around the nucleus in an orbit in which its angular momentum is an integral multiple of $\frac{h}{2\pi}$. (ii) Proof $\frac{mv^2}{r} = \frac{1}{4\pi\epsilon_0} \frac{e^2}{r^2}$ $mvr = \frac{nh}{2\pi}$ Eliminating r we get $v = \frac{e^2}{2\epsilon_0 h} \cdot \frac{1}{n}$ $\therefore v \propto \frac{1}{n}$	1 $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
5.	Generation of emf 2 I - V characteristics 1 Three processes due to which emf is generated in a solar cell are . (i) Generation of electron-hole pairs due to light incident close to the junction. (ii) Separation of electrons and holes due to electric field of the depletion region. Electrons swept to n-side and holes to p-side. (iii) The electrons reaching the n-side are collected by the front contact and the holes reaching the p-side are collected by the back contact. - Thus p-side becomes positive and n-side becomes negative giving rise to photovoltage. 	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1	3
6.	(i) Calculation of speed 1 $\frac{1}{2}$ (ii) Calculation of the distance of closest approach 1 $\frac{1}{2}$		

	(i) $\frac{1}{2}mv^2 = 4.1 \times 1.6 \times 10^{-13} \text{ J}$ $v = \sqrt{\frac{2 \times 4.1 \times 1.6 \times 10^{-13}}{1.673 \times 10^{-27}}}$ $= 2.8 \times 10^7 \text{ m/s}$ (ii) $d = \frac{Ze^2}{4\pi\epsilon_0 \times E_k}$ $= \frac{9 \times 10^9 \times 82 \times 1.6 \times 10^{-19} \times 1.6 \times 10^{-19}}{4.1 \times 1.6 \times 10^{-13}}$ $= 2.88 \times 10^{-14} \text{ m}$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
7.	Effect on angular width of central maximum in the three cases 1 $\frac{1}{2}$ Justification for the three cases 1 $\frac{1}{2}$ In diffraction pattern the angular width of central maximum $= \frac{2\lambda}{a}$ where a is the slit width and λ is the wavelength. (i) Increases As $\theta = \frac{2\lambda}{a}$ and $\lambda_{\text{orange}} > \lambda_{\text{green}}$ (ii) No change / no effect As θ does not depend upon the distance of the screen from the slit(D) (iii) Increases As θ is inversely proportional to the slit width(a). (Note :- Give $\frac{1}{2}$ mark , if only the formula $\theta = \frac{2\lambda}{a}$ is given.)	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	

8

a)

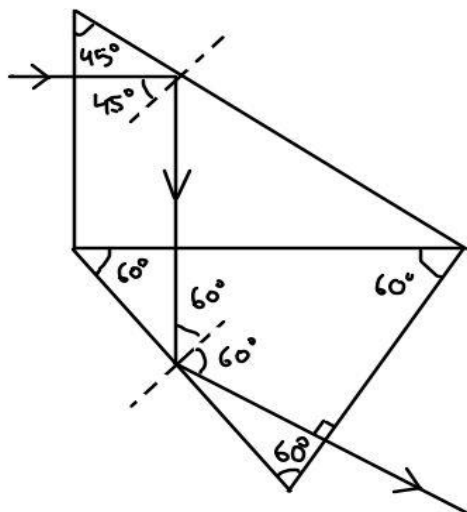
- (a) Two necessary conditions
(b) Tracing the path of the ray

2
1

a) Two conditions

- (i) The light must travel from an optically denser medium to a rarer medium.
(ii) Angle of incidence should be greater than the critical angle.

1
1



(b)

OR

b)

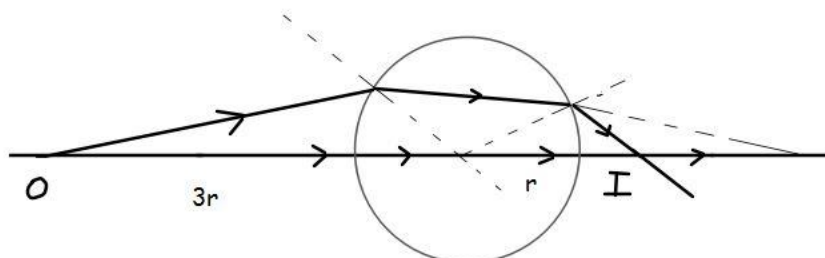
- (a) Obtaining conditions for two cases
(b) Formation of image

2
1

(a) Two conditions $m = \frac{h'}{h} = \frac{v}{u}$

 $\frac{1}{2} + \frac{1}{2}$

- (i) For real images / when object is placed beyond F , As u is negative and v is positive..
(ii) for virtual image / when object is kept between F and the optical centre of the lens. As u and v both are negative.

 $\frac{1}{2} + \frac{1}{2}$ 

1

3

9.	(i) Finding Wavelength1 (ii) Finding Momentum1 (iii) Finding Velocity1 (i)$\lambda = \frac{1.23}{\sqrt{V}} \text{ nm} = \frac{1.23}{\sqrt{100}}$$= 0.123 \text{ nm}$ (ii)$p = \frac{h}{\lambda}$$= \frac{6.63 \times 10^{-34}}{0.123 \times 10^{-9}}$$= 5.4 \times 10^{-24} \text{ kg m s}^{-1}$ (iii)$v = \frac{p}{m}$$v = \frac{5.4 \times 10^{-24}}{9.1 \times 10^{-31}}$$= 5.9 \times 10^6 \text{ m/s}$ Alternative method$v = \sqrt{\frac{2eV}{m}}$$v = \sqrt{\frac{2 \times 1.6 \times 10^{-19} \times 100}{9.1 \times 10^{-31}}}$$= 5.9 \times 10^6 \text{ m/s}$ <td> $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ </td> <td>3</td>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3
10.	(i) Calculating Fringe width1 (ii) Calculating distances of fringes1+1 (i)$\beta = \frac{\lambda D}{d} = \frac{600 \times 10^{-9} \times 1.2}{8 \times 10^{-4}} = 1.2 \text{ mm}$ (ii) (a)$x_3 = \frac{5 \lambda D}{2 d} = \frac{5}{2} \times 1.2 \text{ mm} = 3 \text{ mm}$ (iii) (b)$x_5 = \frac{5 \lambda D}{d} = 2 \times 3 \text{ mm} = 6 \text{ mm}$	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3

