	Marking Scheme				
	Strictly Confidential				
	(For Internal and Restricted use only)				
	Senior School Certificate Examination, 2024				
Cono	SUBJECT PHYSICS (CODE 55/3/3) ral Instructions: -				
Gene					
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				
2	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 various rules of				
	the Board and IPC."				
2	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done				
3	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 due 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, due				
	marks should be awarded.				
	The Marking scheme carries only suggested value points for the answers. These are in the nature				
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own				
4	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.				
	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. The Head-Examiner must go through the first five answer books evaluated by each evaluator on				
5	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.				
	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and				
	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring				
	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and				
5	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. The remaining answer books meant for evaluation shall be given only after ensuring				
	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (✓) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct				
5	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.				
5	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for				
6	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and				
6	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly.				
6	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly. If a question does not have any parts, marks must be awarded in the left-hand margin and				
5 6 7	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly. 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.				
5 6 7	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly. 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. If a student has attempted an extra question, answer of the question deserving more marks should				
5 6 7 8	The Marking scheme carries only suggested value points for the answers. These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly. 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. If there is any variation, the same should be zero after deliberation and discussion. 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. Evaluators will mark (√) wherever answer is correct. For wrong answer CROSS 'X" be marked. Evaluators will not put right (✓) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing. 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 totaled up and written in the left-hand margin and encircled. This may be followed strictly. 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.				

55/3/3 Page 1 of 14

	1.011 1.0 1.0701 1.1 1.71 1.1 1.1 1.1 1.101
11	A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer
11	deserves it.
10	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every
12	day and evaluate 20 answer books per day in main subjects and 25 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.
	Ensure that you do not make the following common types of errors committed by the Examiner in
13	the past:-
	 Leaving answer or part thereof unassessed in an answer book.
	Giving more marks for an answer than assigned to it.
	Wrong totaling of marks awarded on an answer.
	Wrong transfer of marks from the inside pages of the answer book to the title page.
	Wrong question wise totaling on the title page. When the first state of the first s
	Wrong totaling of marks of the two columns on the title page. Wrong grand total
	 Wrong grand total. Marks in words and figures not tallying/not same.
	 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.
	While evaluating the answer books if the answer is found to be totally incorrect, it should be
14	marked as cross (X) and awarded zero (0)Marks.
	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by
15	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.
	The Examiners should acquaint themselves with the guidelines given in the "Guidelines for Spot
16	Evaluation" before starting the actual evaluation.
	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title
17	page, correctly totaled and written in figures and words.
	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the
18	prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once
	again reminded that they must ensure that evaluation is carried out strictly as per value points for
	each answer as given in the Marking Scheme.

55/3/3 Page 2 of 14

Q.NO. VALUE POINT/ EXPECTED ANSWERS MARKS TOTAL MARKS 1. (B) 0.1mC 1 2 1 1 1 2 1 1 1 1 2 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 1 1 3 2		MARKING SCHEME: PHYSICS (042)		
SECTION A 1. (B) 0.1mC				
1. (B) 0.1mC 1 1 2. (B) $1.6 \times 10^{-18} \text{ J}$ 1 1 3. (C) $-(0.24 \text{ nT}) \hat{k}$ 1 1 4. (D) Sodium Chloride 1 1 5. (B) 0.3 MB 1 1 6. (D) 100 V 1 1 7. (B) I is decreased and A is increased 1 1 8. (A) $+z$ direction and in phase with \vec{E} 1 1 9. (B) 2 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 1 1 11. (B) decreased by 87.5% 1 1 1 12. (B) 0.05 eV 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 1 1 1 14. (C) Assertion (A) is false and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 1 1 1 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 1 1 1 16. (A) Both Assertion (A) 1 1	Q.NO.	VALUE POINT/ EXPECTED ANSWERS	MARKS	
2. (B) $1.6 \times 10^{-18} \text{ J}$ 3. (C) $-(0.24 \text{ nT}) \hat{k}$ 4. (D) Sodium Chloride 1 1 1 5. (B) 0.3 MB 6. (D) 100 V 1 1 7. (B) I is decreased and A is increased 1 1 1 8. (A) $+z$ direction and in phase with \vec{E} 1 1 1 9. (B) 2 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 11. (B) decreased by 87.5% 11 1 1 12. (B) 0.05 eV 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 11. (C) Assertion (A) is true but Reason (R) is false. 11. (C) Assertion (A) is true but Reason (R) is false. 12. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{V_2}{D}$ Derivation of R $\frac{E}{D}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{D}\tau \qquad(i)$ Current flowing through a conductor of length I and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2AT^2}{mI}$ $R = \frac{V}{I} = \frac{mI}{mI}$ $R = \frac{V}{I} = \frac{mI}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge V_2 Obtaining the condition when current flows through		SECTION A		
3. (C) $-(0.24 \text{nT}) \hat{k}$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1.		1	1
(C) $-(0.24 \text{ nf}) \ k$ 4. (D) Sodium Chloride 1 1 1 5. (B) 0.3 MB 1 1 1 7. (B) l is decreased and A is increased 1 1 1 7. (B) l is decreased and A is increased 1 1 1 7. (B) l is decreased and A is increased 1 1 1 9. (B) 2 1 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 1 1 1 11. (B) l decreased by 87.5% 1 1 1 1 12. (B) 0.05 eV 1 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 1 1 1 14. (C) Assertion (A) is true but Reason (R) is false. 1 1 1 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{\sqrt{2}}$ Derivation of R		(B) 1.6×10^{-18} J	1	1
4. (D) Sodium Chloride 5. (B) 0.3 MB 1 1 1 5. (B) 0.3 MB 1 1 1 7. (B) 1 is decreased and A is increased 1 1 1 7. (B) 1 is decreased and A is increased 1 1 1 7. (B) 1 is decreased and A is increased 1 1 1 7. (B) 2 is decreased and A is increased 1 1 1 7. (A) $+2$ direction and in phase with \overline{E} 1 1 1 7. (A) $+2$ direction and in phase with \overline{E} 1 1 1 8. (A) $+2$ direction and in phase with \overline{E} 1 1 1 10. (A) $+2$ direction and in phase with \overline{E} 1 1 1 11. (B) decreased by 87.5% 1 1 1 12. (B) 0.05 eV 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 1 1 1 14. (C) Assertion (A) is true but Reason (R) is false. 1 1 1 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 8 SECTION B 17. Meaning of relaxation time $+1$ /2 decreased time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $+1$ /2 Decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% New Yearage time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $+1$ /2 Decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading of relaxation time $+1$ /2 decreased by 87.5% Reading o	3.	(C) $-(0.24 \text{ nT}) \hat{k}$	1	1
6. (D) 100 V 7. (B) I is decreased and A is increased 1 1 1 8. (A) +z direction and in phase with \overline{E} 1 1 1 9. (B) 2 1 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 11. (B) decreased by 87.5% 1 1 1 12. (B) 0.05 eV 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 1 1 1 14. (C) Assertion (A) is true but Reason (R) is false. 1 1 1 15. (A) Both Assertion (A) and Reason (R) is true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{\sqrt{2}}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau$ (i) Current flowing through a conductor of length l and area of cross section A $l = neAv_d$ (ii) $l = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $l = \frac{ne^2AT}{m} = \frac{ne^2A\tau V}{ml}$ $l = \frac{V}{l} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{V_2}{l}$ Obtaining the condition when current flows through	4.		1	1
7. (B) l is decreased and A is increased 8. (A) +z direction and in phase with \overline{E} 9. (B) 2 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 11. (B) decreased by 87.5% 11. 1 12. (B) 0.05 eV 13. (D) Assertion (A) is false and Reason (R) is also false. 14. (C) Assertion (A) is true but Reason (R) is false. 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{V_2}{I}$ Derivation of R Weaning of relaxation time $\frac{V_2}{I}$ Drift velocity of an electron $\frac{eE}{I} \tau$ (i) Current flowing through a conductor of length l and area of cross section A $I = neAv_d$ (ii) $I = \frac{ne^2AET}{m} \frac{ne^2ATV}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{V_2}{I}$ Obtaining the condition when current flows through	5.	(B) 0.3 MB	1	1
8. (A) +z direction and in phase with \overline{E} 1 1 1 9. (B) 2 1 1 1 1 1 10. (A) $\frac{\lambda}{\sqrt{2}}$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		()	1	1
9. (B) 2		(B) <i>l</i> is decreased and A is increased		
10. (A) $\frac{\lambda}{\sqrt{2}}$ 11. (B) decreased by 87.5% 1 1 1 12. (B) 0.05 eV 1 1 1 13. (D) Assertion (A) is false and Reason (R) is also false. 1 1 1 14. (C) Assertion (A) is true but Reason (R) is false. 1 1 1 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau$ ——(i) Current flowing through a conductor of length l and area of cross section A $I = neAv_d =(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{1}{2}$ Obtaining the condition when current flows through	8.	(A) +z direction and in phase with \vec{E}	1	1
11. (B) decreased by 87.5% 11. (B) decreased by 87.5% 12. (B) 0.05 eV 13. (D) Assertion (A) is false and Reason (R) is also false. 14. (C) Assertion (A) is true but Reason (R) is false. 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau$ ———(i) Current flowing through a conductor of length l and area of cross section A $l = neAv_d$ ———(ii) $l = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $l = \frac{r}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{1}{2}$ Obtaining the condition when current flows through				
11.(B) decreased by 87.5%1112.(B) 0.05 eV1113.(D) Assertion (A) is false and Reason (R) is also false.1114.(C) Assertion (A) is true but Reason (R) is false.1115.(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).1116.(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).11SECTION B17.Meaning of relaxation time Derivation of R $\frac{1}{1}$ Average time between two successive collisions of electron in presence of electric field. $\frac{1}{1}$ Drift velocity of an electron $v_d = \frac{eE}{m} \tau$ $v_$	10.	$(A)\frac{\lambda}{\sqrt{2}}$	1	1
13. (D) Assertion (A) is false and Reason (R) is also false. 14. (C) Assertion (A) is true but Reason (R) is false. 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Derivation of R $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau$ (i) Current flowing through a conductor of length l and area of cross section A $l = neAv_d$ (ii) $l = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $l = \frac{V_2}{l}$ OR Circuit diagram of Wheatstone bridge $\frac{1}{2}$ Obtaining the condition when current flows through	11.	(B) decreased by 87.5%	1	1
14. (C) Assertion (A) is true but Reason (R) is false. 15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau$ ——(i) Current flowing through a conductor of length l and area of cross section A $l = neAv_d$ ——(ii) $l = \frac{ne^2 AE\tau}{m} = \frac{ne^2 A\tau V}{ml}$ $l = \frac{eV}{l} = \frac{ml}{ne^2 \tau A}$ OR Circuit diagram of Wheatstone bridge v_d Obtaining the condition when current flows through			1	1
15. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Derivation of R $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau = \frac{(i)}{m}$ Current flowing through a conductor of length l and area of cross section A $l = neAv_d =(ii)$ $l = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $l = \frac{V}{l} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{1}{2}$ Obtaining the condition when current flows through				
correct explanation of the Assertion (A). 16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Derivation of R $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau(i)$ Current flowing through a conductor of length l and area of cross section A $l = neAv_d(ii)$ $l = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ l				
16. (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A). SECTION B 17. Meaning of relaxation time $\frac{1}{2}$ Derivation of R $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m} \tau$ (i) Current flowing through a conductor of length l and area of cross section A $I = neAv_d$ (ii) $I = \frac{ne^2 AE\tau}{m} = \frac{ne^2 A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2 \tau A}$ OR Circuit diagram of Wheatstone bridge $\frac{1}{2}$ Obtaining the condition when current flows through	15.		1	1
Meaning of relaxation time Derivation of R 1½ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau \qquad(i)$ Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through	16.	(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the	1	1
Meaning of relaxation time $\frac{1}{2}$ Derivation of R $\frac{1}{2}$ Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau \qquad(i)$ $U_d = \frac{eE}{m} \tau \qquad(i)$ Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR $Circuit diagram of Wheatstone bridge$ Obtaining the condition when current flows through		SECTION B		
Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau \qquad(i)$ Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through	17.			
Average time between two successive collisions of electron in presence of electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau \qquad(i)$ Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2AE\tau}{m} = \frac{ne^2A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through		Meaning of relaxation time ½		
electric field. Drift velocity of an electron $v_d = \frac{eE}{m}\tau \qquad(i)$ Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2 AE\tau}{m} = \frac{ne^2 A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2 \tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through				
Current flowing through a conductor of length l and area of cross section A $I = neAv_d \qquad(ii)$ $I = \frac{ne^2 AE\tau}{m} = \frac{ne^2 A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2\tau A}$ OR $Circuit diagram of Wheatstone bridge \frac{1}{2} Obtaining the condition when current flows through$		electric field. Drift velocity of an electron	1/2	
$I = neAv_d \qquad(ii)$ $I = \frac{ne^2 AE\tau}{m} = \frac{ne^2 A\tau V}{ml}$ $R = \frac{V}{I} = \frac{ml}{ne^2 \tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through		$\upsilon_d = \frac{\epsilon L}{m} \tau$ (i)	1/2	
$R = \frac{V}{I} = \frac{ml}{ne^2 \tau A}$ OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through		$I = neAv_d$ (ii)		
OR Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through			1/2	
Circuit diagram of Wheatstone bridge Obtaining the condition when current flows through			1/2	
Obtaining the condition when current flows through		UK		
galvanometer 1½				
		galvanometer 1½		

55/3/3 Page 3 of 14

	8		
	Tannan Isanan Is	1/2	
	By applying Kirchoff's loop rule to closed loops ADBA and CBDC $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	1/2	
	$\frac{I_1}{I_2} = \frac{R_2}{R_1}$ From eq (ii) -	1/2	
	$\frac{I_1}{I_2} = \frac{R_4}{R_3}$		
	Hence, $\frac{R_2}{R_1} = \frac{R_4}{R_3}$	1/2	2
18.	Finding the focal length of objective lens 2		
	Magnifying power =24, Distance between lenses =150 cm $\frac{f_o}{f_e} = 24$	1/2	
	$f_o + f_e = 150 \text{ cm}$ $f_e = 6 \text{ cm}$ $f_o = 144 \text{ cm}$	1/ ₂ 1/ ₂ 1/ ₂	2
19.	Sustained or stable interference 1 Conditions for sustained interference 1 When position of maxima and minima is not changing with time,		
	 interference pattern is called sustained or stable interference. Light sources must be coherent 	1	2
20.	Possibility of emission of electron 1 Calculation of longest wavelength of emitted electron 1 $E = \frac{hc}{a}$		
	λ		

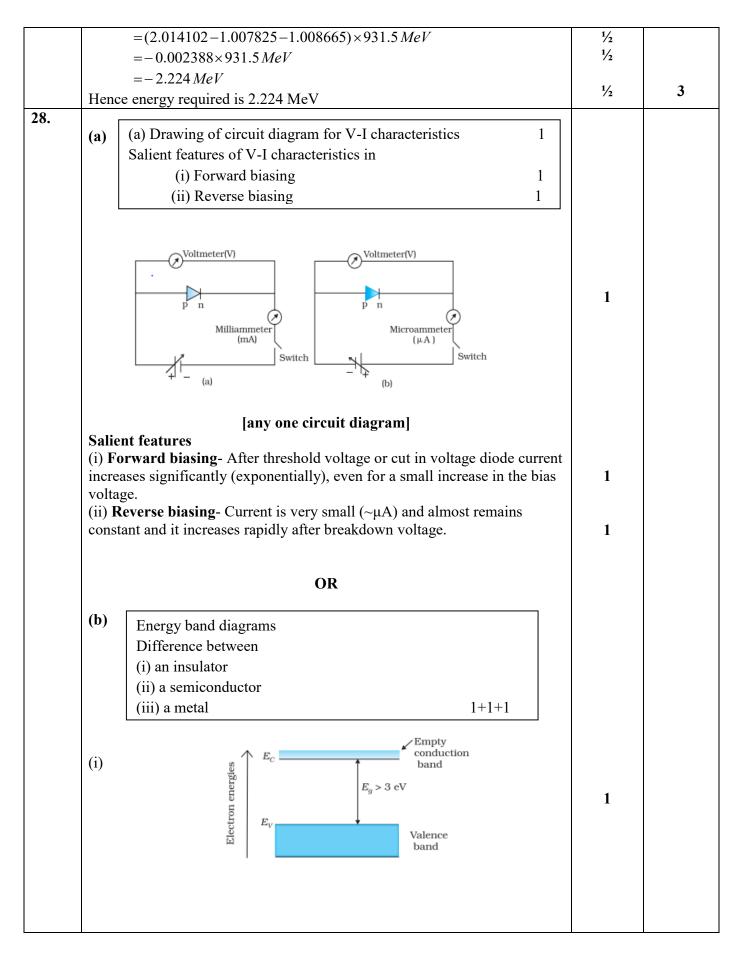
	$=\frac{1240eVnm}{}$	1/2	
	600 nm		
	=2.06eV		
	: Work function $\phi_0 = 2.3 eV$		
	$\therefore E < \phi_0$ No emission will take place.	1/2	
	$\lambda_{\max} = \frac{hc}{\phi}$		
	ϕ		
	_1240 eV nm	1/2	
	$=\frac{1240eVnm}{2.3eV}$, 2	
	$\lambda_{\text{max}} = 539.13 nm$	1/2	2
21.	Calculation of concentration of holes & electrons 2		
	$n_e n_h = n_i^2$	1/2	
	$n_h \approx 5 \times 10^{22} / m^3$		
	$n_e = \frac{n_i^2}{n_h}$		
	$n_e = \frac{(1.5 \times 10^{16})^2}{5 \times 10^{22}}$	1/2	
	$n_e = 4.5 \times 10^9 / m^3$	1/2	
	$n_h > n_e$, it is a p- type crystal	1/2	2
	SECTION C		
22.			
	Calculation of		
	(a) Electric field across the wire		
	(b) Current density 1		
	(c) Average relaxation time (c)		
	(a) $E = \frac{V}{I}$	1,	
	·	1/2	
	$=\frac{1.0 V}{1.0 m}=1.0 \text{ V/m}$	1/2	
	(b) $J = I / A$	1/2	
	$J = \frac{1.6 A}{1.0 \times 10^{-7} m^2} = 1.6 \times 10^7 \text{ A/m}^2$	1/2	
	(c) $\tau = \frac{m}{ne^2} \frac{J}{E}$	1/2	
	$= \frac{9.1 \times 10^{-31} \times 1 \times 1.6}{9 \times 10^{28} \times \left(1.6 \times 10^{-19}\right)^2}$	/2	
	$9\times10^{28}\times(1.6\times10^{-19})^2$		
	$=6.31\times10^{-14}$ s	1/2	3

23.			
20.	Derivation of magnetic dipole moment 2 ½		
	Gyromagnetic ratio ½		
	Electron revolve around the nucleus constitute a current		
	$I = \frac{e}{T}$	1/2	
	$T = \frac{2\pi r}{2\pi}$		
	$T = \frac{1}{v}$		
	$I = \frac{ev}{2\pi r}$	1/2	
	$2\pi r$ Magnetic moment, M =I.A		
	$\mu_l = \frac{ev.\pi r^2}{2\pi r}$	1/2	
	$\mu_l = \frac{evr}{2}$		
		1/2	
	$(L = mvr)$ $C = \frac{1}{2} + \frac{1}{2} $		
	Since electron has negative charge, μ_l is opposite in direction of an electron of angular momentum L.		
	$\overrightarrow{\mu_l} = -\frac{e}{2m}\overrightarrow{L}$	1/2	
	Gyromagnetic ratio - The ratio of magnetic moment to angular momentum is called gyromagnetic ratio.		
	That is, $\frac{\mu_e}{L} = \frac{e}{2m}$	1/2	3
	[Note- give half mark of gyromagnetic ratio to each student, if it is not attempted]]		
4.	Proof of induced charge 3		
	Using Faraday's law of electromagnetic induction		
	$ \varepsilon = \frac{\Delta \phi}{\Delta t}$	1/	
	$\begin{vmatrix} \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot \end{vmatrix}$	1/2	
	$I = \frac{ \varepsilon }{R}$	1/2	
	11	1/2	
	$I = \frac{1}{R} \left(\frac{\Delta \phi}{\Delta t} \right)$	72	
	$\triangle Q = 1 (\triangle \phi)$	1/2	
	$\frac{\triangle Q}{\triangle t} = \frac{1}{R} \left(\frac{\triangle \phi}{\triangle t} \right)$ $\triangle Q = \frac{\triangle \phi}{R}$		
	$\triangle O = \frac{\triangle \phi}{\Box}$	1/2	
	1		
	Hence induced charge depends on change in magnetic flux, not on the time interval of flux change.	1/2	3
		/2	<u> </u>
	(a) Finding the wavelength and frequency 1+1 (b) Finding the amplitude of magnetic field ½		
	(0) I maing the amplitude of magnetic field /2		
	(c) Writing expression for magnetic field ½		

55/3/3 Page 6 of 14

	(a) $k = \frac{2\pi}{\lambda}$	1/2	
	$\lambda = \frac{2\pi}{K} = \frac{4\pi}{3} \mathrm{m} = 4.18 \mathrm{m}$	1/2	
	$\omega = 2\pi \upsilon$	1/2	
	$v = \frac{\omega}{2\pi} = \frac{4.5 \times 10^8}{2\pi} \text{ Hz}$		
	$v = \frac{9}{4\pi} \times 10^8 \text{Hz}$	1/2	
	$v = 7.16 \times 10^{-1} \text{ Hz}$ (b) $B_0 = \frac{E_0}{c}$		
	$\begin{array}{ccc} (0) & B_0 = \frac{1}{c} \\ & 6.3 & & & \\ \end{array}$	1/2	
	$B_0 = \frac{6.3}{3 \times 10^8} = 2.1 \times 10^{-8} \mathrm{T}$	/2	
	(c) $\vec{B} = 2.1 \times 10^{-8} [(\cos 1.5 \text{ rad/m}) \text{ y} + (4.5 \times 10^8 \text{ rad/s}) \text{ t}] \hat{k} \text{ T}$	1/2	3
26.	Statement of Bohr's second postulates ½		
	Derivation of $r_n \alpha n^2$ $2\frac{1}{2}$		
	Bohr's second postulate Electron revolves around the nucleus only in those orbits for which the	1/2	
	angular momentum in some integral multiple of $h/2\pi$. Electrostatic force between revolving electron & nucleus provide requisite centripetal force		
	$\left \frac{mv_n^2}{r_n} = \frac{1}{4\pi\varepsilon_0} \frac{e^2}{r_n^2}\right $	1/2	
	$v_n = \frac{e}{\sqrt{4\pi\varepsilon_0 m r_n}} \tag{i}$	1/2	
	$mv_n r_n = \frac{nh}{2\pi}$ (ii)	1/2	
	From eqn. (i) and (ii) $(2)(3)(3)^{2} = 4$		
	$r_n = \left(\frac{n^2}{m}\right) \left(\frac{h}{2\pi}\right)^2 \frac{4\pi\varepsilon_0}{e^2}$	1/2	
	$r_n \propto n^2$	1/2	3
27.	(a) Definition of Atomic mass unit (u) 1 (b) Calculation of energy required 2		
	(a) Atomic mass unit (u) is defined as $1/12^{th}$ of the mass of the carbon	1	
	$\binom{12}{C}$ atom.	1	
	(b) $m(_1H^2) \rightarrow m(_1H^1) + m(_0n^1)$	1/2	
	$Q = (m_R - m_P) \times 931.5 MeV$		

55/3/3



55/3/3 Page 8 of 14

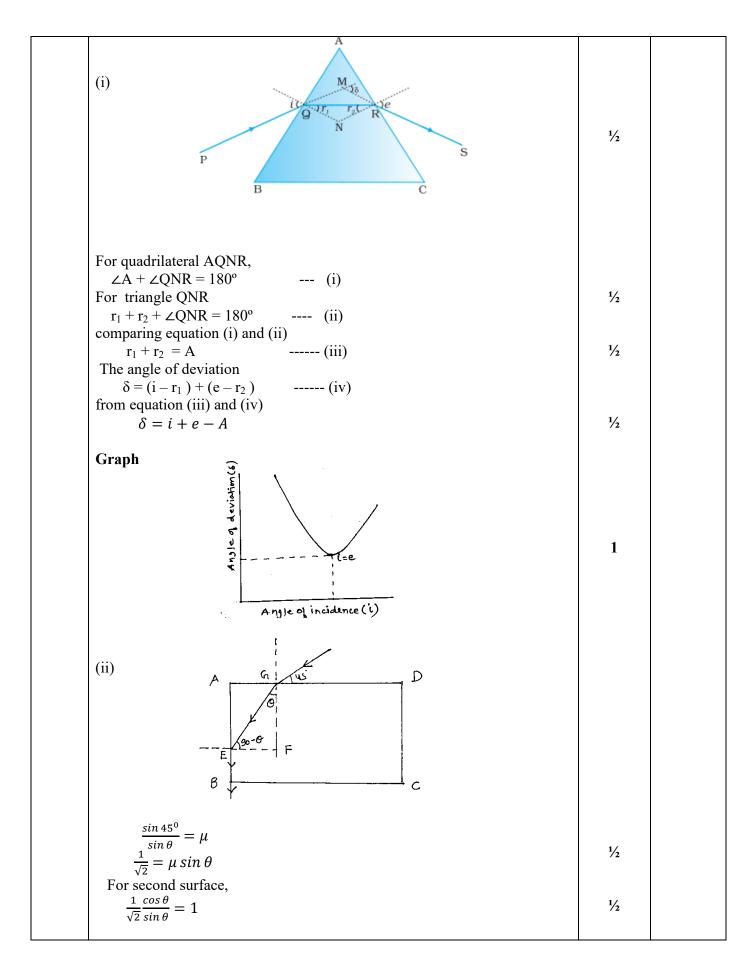
	T	Г	
	(ii) $ \underbrace{\sum_{\substack{\text{E}_g < 3 \text{ eV}}}^{\text{EC}}}_{E_g < 3 \text{ eV}} $	1	
	(iii) Overlapping conduction band $E_{V} = E_{C}$ Valence band	1	3
	SECTION D		
29.	(i) (D) IV	1	
	(ii) (D) accelerate along $-\hat{i}$ (iii) (A) V= V ₀ + α x (iv) (a) (C) E ₄ > E ₃ > E ₂ > E ₁	1 1	
	OR (b) (B) 2.6×10^6 m/s	1	4
30.	(i) (D) 6 (ii) (C) 3 (iii) (a) (C)6	1 1	
	OR	1	
	(b) (B) sin ⁻¹ (0.225) (iv) (D) 10	1	4
	SECTION E		
31.	(a) (i) Obtaining expression for the capacitance 3 (ii) Finding the electric potential 2 (i) at the surface (ii) at the centre When a dielectric slab is inserted between the plates of capacitance there is		
	induced charge density σ_P which opposes the original charge density (σ) on the plate of capacitance. Electric field with dielectric medium is	1/2	
	$E = \frac{(\sigma - \sigma_P)}{\sigma}$	1/2	
	$E = \frac{(\sigma - \sigma_P)}{\varepsilon_0}$ $V = E \times d = \frac{(\sigma - \sigma_P)}{\varepsilon_0} d$	1/2	
	$(\sigma - \sigma_P) = \frac{\sigma}{K}$	1/2	
	$V = \frac{\sigma d}{\varepsilon_0 K} = \frac{Qd}{A\varepsilon_0 K}$	1/2	
	$C = \frac{Q}{V} = \frac{K\varepsilon_0 A}{d}$	1/2	

55/3/3 Page 9 of 14

(ii) Elec	tric potential due to a point charge		
$V = \frac{1}{4\pi\epsilon_0}$	<u>.q</u>	1/2	
· 4πε ₀	r		
(i) At th	e surface		
$V-\frac{1}{2}$	$\frac{q}{}$ = $\frac{9 \times 10^{9} \times 6 \times 10^{-6}}{}$	1/	
$V - \frac{1}{4\pi\epsilon_0}$	$\frac{q}{r} = \frac{9 \times 10^9 \times 6 \times 10^{-6}}{0.2}$	1/2	
V=2	$.7 \times 10^5 \text{ V}$	1/2	
v — 2	., , , 10 ,		
(;;) G;	1 4 ' 6 11' '1 4 1 11 1 1 1 77		
	ce electric field inside the hollow sphere is zero, hence V remains		
	throughout the volume.	1/2	
Ţ	$V = 2.7 \times 10^5 \text{ V}$	/2	
	OR		
(b)			
(0)	(i) Expression for electric field at appoint lying		
	(i) inside		
	(ii) outside 2		
	(ii) Explanation 2		
	(ii) Explaination		
(i)	Field inside the shell		
	Gaussian surface		
	Surface charge		
	density o		
	/ R		
	o l		
	The same of the sa		
The Flu	x through the Gaussian surface is		
	$4\pi R^2$	1/2	
	ase Gaussian surface enclosed no charge.		
	$C \times 4\pi R^2 = 0$		
	z = 0	1/	
	Neward full credit of this part if a student writes directly E=0,	1/2	
mentior	ning as there is no charge enclosed by Gaussian surface)		
(**) T			
(ii) <u>Fiel</u>	d outside the shell-		
	Gaussian		
	Surface charge surface		
	density o		
	R	1/	
	(0)	1/2	
	\ r\/_		
	P		
		i	1

		1	
	Electric flux through Gaussian surface	17	
	$E \times 4\pi r^2 = \frac{(\sigma 4\pi R^2)}{\varepsilon_0}$	1/2	
	Charge enclosed by the Gaussian surface		
	$E \times 4\pi r^2 = \frac{(\sigma 4\pi R^2)}{\varepsilon_0}$		
	Using Gauss's law:		
	$\int \vec{E} \cdot \vec{ds} = \frac{Q}{\varepsilon_0}$	1/2	
	$\int L \cdot u ds = \frac{1}{\varepsilon_0}$, -	
	$E \times 4\pi r^2 = \frac{(\sigma 4\pi R^2)}{\varepsilon_0}$		
	$rac{\varepsilon_0}{\sigma R^2}$ q		
	$E = \frac{\sigma}{\varepsilon_0} \frac{R^2}{r^2} = \frac{q}{4\pi\varepsilon_0 r^2}$	1/2	
	(ii) For conducting sheet,		
	Electric field due to a conducting sheet		
	$E_c = \frac{\sigma}{\varepsilon_0}$	1/2	
	Surface		
	z charge density σ		
	y y		
	E 2 E		
	$\leftarrow x \longrightarrow \leftarrow x \longrightarrow$		
	For non-conducting sheet		
	$E_{nc} = \frac{\sigma}{2\varepsilon_0}$	1/2	
	Since surface charge density is same.	1/2	
	$2E_{nc} = E_c$	1/2	5
32.	ZDNC DC		
	(a) (i)(1) Meaning of current sensitivity, mentioning factors 2		
	(2) Finding the required resistance 1½		
	(ii) Finding the required resistance 17/2 (ii) Finding the induced current 1½		
	(ii) I maing the madeca current		
	(i) (1) Current sensitivity of galvanometer is defined as the deflection per		
	unit current.	1	
	Alternatively,		
	$\frac{\phi}{I} = \frac{NBA}{K}$		
	Factors		
	Number of turns in coil, Magnetic field intensity, Area of coil, Torsional	1/ : 1/	
	Constant (Any two)	1/2+1/2	
	(2) $R = \frac{V}{2} - G$ for (0-V) Range	1/2	
	(2) $R = \frac{V}{I} - G$ for (0-V) Range $R_1 = \frac{V}{2I} - G$ for $(0 - \frac{V}{2})$ Range $\frac{V}{I} = R + G$	/2	
	$\kappa_1 = \frac{1}{2I} - G$ for $(0 - \frac{1}{2})$ range	1/2	
	$\frac{v}{I} = R + G$	/2	
	$R_1 = \left(\frac{R+G}{2}\right) - G$		
	•		

	$R_1 = \frac{R - G}{2}$	1/2	
	$R_1 = \frac{1}{2}$	/2	
	(ii) $\phi = (2.0t^3 + 5.0t^2 + 6.0t) \text{ mWb}$		
	$ \varepsilon = \frac{d\phi}{dt} = 50 \times 10^{-3} \text{ V}$	1/2	
	$\mathrm{I}=rac{ arepsilon }{R}$	1/2	
	$I = \frac{{}^{R}_{50 \times 10^{-3}}}{5} A = 10 \text{ mA}$	1/2	
	5		
	OR		
	(b) (i) Obtaining the expression of emf induced 3		
	(ii) Calculation of mutual inductance 2		
	N S Slip 00000 Alternating emf	1	
	(i) The flux at any instant t is		
	$\phi = NBA \cos\theta = NBA \cos\omega t$	1/2	
	From Faraday's law		
	$\varepsilon = -\frac{d\phi_B}{dt}$	1/2	
	$c = -\frac{dt}{dt}$	/2	
	$=-NBA\frac{d}{dt}(\cos\omega t)$	1/2	
	dt		
	$\boldsymbol{\varepsilon} = -NBA \ \omega \sin \omega t$	1/2	
	(ii) $M = \frac{\mu_0 \pi r_1^2}{2r_2} = \frac{4\pi \times 10^{-7} \times \pi r_1^2}{2r_2}$	1/2+1/2	
	$2r_2$ $2r_2$		
	$2\times10\times10^{-7}\times(10^{-2})^2$	1/	
	$=\frac{2\times10\times10^{-7}\times\left(10^{-2}\right)^2}{100\times10^{-7}}$	1/2	
	$= 2 \times 10^{-10} \text{H}$	1/2	5
33.			
	(a) (i) Tracing the path of Ray ½ Obtaining an expression for angle deviation 11/		
	Obtaining an expression for angle deviation 1½ Drawing Graph 1		
	(ii) Finding the refractive index 2		
	(ii) I maing the foliative mack		



ta	$n \theta = \frac{1}{\sqrt{2}}$		
I	$^{\sqrt{2}}$ n the triangle GEF	1/2	
	$\sin \theta = \frac{1}{\sqrt{3}}$		
	$\mu = \sqrt{\frac{3}{2}}$	1/2	
	V		
	OR		
(b)	(i) Expression for resultant intensity 3		
	(ii) Ratio of intensities 2		
(i)	$y_1 = a \cos \omega t$		
` /	$a_2 = a \cos(\omega t + \phi)$		
	ording to the principle of superposition		
	$y = y_1 + y_2$	1/2	
-	$y = a \cos \omega t + a \cos(\omega t + \phi)$ $y = a \cos \omega t + a \cos \omega t \cos \phi - a \sin \omega t \sin \phi$		
	$t = a\cos\omega t + a\cos\omega \cos\phi - a\sin\omega \cos\phi$ $t = a\cos\omega t (1 + \cos\phi) - a\sin\phi \sin\omega t$	1/2	
Let,			
	$a(1 + \cos \phi) = A\cos \theta \qquad (i)$		
•	$a \sin \phi = A \sin \theta$ (ii) Squaring and adding equation (i) and (ii)	1/2	
	$A^2 = a^2 (1 + \cos\phi)^2 + a^2 \sin^2 \phi$		
	11 d (2 · cosy) · w sur y		
	$= a^2(1 + \cos^2\phi + 2\cos\phi) + a^2\sin^2\phi$		
	$=2a^2(1+\cos\phi)$		
	$=4a^2\cos^2\phi/2$	1/2	
	$I\alpha A^2$		
**	$I = kA^2$ where k is constant	1/2	
	$4ka^2 \cos^2 \phi / 2$	1/2	
	ard full credit for this part for any other alternative methods]	, -	
O	$\phi_1 = \frac{2\pi}{\lambda} \times \frac{\lambda}{6} = \pi/3$	1/2	
	$I_1 = 4I_0 \cos^2 \phi / 2$		
	$I_1 = 4I_0 \cos \phi / 2$ = $4I_0 \cos^2(\pi/6)$		
	$I_1 = 3I_0$	1/2	
	$\phi_2 = \frac{2\pi}{\lambda} \times \frac{\lambda}{12} = \pi/6$	/2	
	$I_2 = 4I_0 \cos^2(\pi/12)$	1/2	
	$I_2 = 4I_0 \cos^2 15^0$		
	$\frac{\bar{I}_1}{I_2} = \frac{3}{4\cos^2 150}$	1/2	5
	-	1	