

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior School Certificate Examination, 2025
SUBJECT NAME ELECTRICAL TECHNOLOGY (Q.P. CODE 343)

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 various rules of the Board and 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 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.
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.
5	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.
6	Evaluators will mark($\sqrt{\quad}$) wherever answer is correct. For wrong answer CROSS ‘X’ be marked. Evaluators will not put right (\checkmark) while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7	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.
8	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.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note “Extra Question” .

10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks _____(example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every 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.
13	<p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> ● 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. ● Wrong totaling of marks of the two columns on the title page. ● 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.
14	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.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling 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.
16	The Examiners should acquaint themselves with the guidelines given in the “ Guidelines for Spot Evaluation ” before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the 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.

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MARKING SCHEME
ELECTRICAL TECHNOLOGY

SECTION A

(Objective Type Questions)

(30 marks)

1. Answer any **4** out of the given **6** questions on Employability Skills. $4 \times 1 = 4$
- (i) An adjective is a word that describes other words 1
 - (ii) obsessive disorder 1
 - (iii) borderline disorder 1
 - (iv) Ctrl + A 1
 - (v) Two roles of entrepreneur are : 1
 - 1. Identifying entrepreneurial opportunity
 - 2. Turning ideas into action
 - (vi) Rainwater Harvesting System 1
2. Answer any **5** out of the given **7** questions. $5 \times 1 = 5$
- (i) (C) 746 watts 1
 - (ii) (B) Three 1
 - (iii) (C) Q-Factor 1
 - (iv) (D) Cylindrical 1
 - (v) (C) Armature Current 1
 - (vi) (D) Megger 1
 - (vii) (C) Capacitor start or capacitor run motor 1
3. Answer any **6** out of the given **7** questions. $6 \times 1 = 6$
- (i) Capacitor start motor, split phase motor, shaded pole motor, permanent split capacitor motor (Any two only) 1
 - (ii) It is used for measuring the power consumption 1
 - (iii) Number of complete cycle that a wave completes in a second 1
 - (iv) Transparent glass , stainless steel (Any one) 1

- (v) Oil Natural Air Natural 1
- (vi) An AC Motor which employ rotor whose shape resemble squirrel cage. 1
- (vii) Connect one end of testing lead to one terminal of plug top and another to metal part, if lamp glows, it means there is an earth fault. 1
4. Answer any 5 out of the given 6 questions. 5×1=5
- (i) True 1
- (ii) False 1
- (iii) True 1
- (iv) True 1
- (v) False 1
- (vi) True 1
5. Answer any 5 out of the given 6 questions. 5×1=5
- (i) Vertical 1
- (ii) $\frac{1}{25}$ HP to $\frac{1}{6}$ HP 1
- (iii) Mechanical 1
- (iv) Negative 1
- (v) No load to full load 1
- (vi) Ground fault circuit interrupter (GFCI) 1
6. Answer any 5 out of the given 6 questions. 5×1=5
- (i) (C) 20 1
- (ii) (A) Hair dryer 1
- (iii) (A) Zero 1
- (iv) (C) Cardiopulmonary Resuscitation 1
- (v) (B) Easy to maintain 1
- (vi) (C) To control direction of flow of current 1

SECTION B
(Subjective Type Questions)

(30 Marks)

Answer any 3 out of the given 5 questions on Employability Skills. Answer each question in 20 – 30 words. 3×2=6

7. Active listening involve the following steps (Any 4 only)
1. Listen attentively or pay attention
 2. Understanding, show you are listening through body language and gestures
 3. Retrieval or recall information from past
 4. Evaluating
 5. Responding to what is said 2
8. Self-motivation is important because
- It increases individual's energy and activity
 - It directs an individual towards specific goals
 - It results in initiation and persistence of specific activities
 - It affects cognitive processes and learning strategies used for completing similar tasks 2
9.
 1. Click the text button on the drawing bar
 2. The mouse pointer changes to + sign
 3. Place the mouse pointer on the slide where you want to add the text box
 4. Click and drag on the slide to draw a text box 2
10. Barriers to becoming an effective entrepreneur are : 2
- a. Unsupportive business
 - b. Employee related difficulties
 - c. Market entry regulations
 - d. Shortage of funds and resources
 - e. Lack of entrepreneurial capacity
 - f. Lack of Adequate entrepreneurship training
 - h. Fear of failure

11. Green jobs are found in many sectors of the economy. They help to cut the consumption of energy, raw materials and water through high-efficiency strategies, de-carbonize the environment and reduce greenhouse gas emissions, minimize or avoid altogether all forms of waste and pollution, protect and restore ecosystems and biodiversity. 2

Answer any 3 out of the given 5 questions in 20 – 30 words each.

3×2=6

12. Characteristics :

- DC compound motor has high starting torque no load connection is permissible
- Differential compound motor its speed increases as load decreases

Application :

1. Rolling Mills
2. punch machine
3. Presses
4. heavy planner machine
5. shear machine
6. reciprocating machine 2

13. Possible faults and their removals

If the mixer does not work properly, follow the following instructions : 2

- (a) By switching on the supply, if the shaft of the motor does not rotate, check the supply, supply leads, connections at the switch and connections at the motor terminals and also test the continuity of the motor with the help of series test lamp. If the connections are broken, connect them. If the motor is defective, repair it or replace it.
- (b) If the tip bowl leaks, set it properly with the leak proof insulation.
- (c) If the blades are broken, replace them.
- (d) If the switch knob is loose, tighten it properly.
- (e) If the motor burns, get it rewound or replace it.
- (f) If the blade does not rotate properly (freely), reduce the load.

14. Safety measure precautions of transformer from the operational point of view

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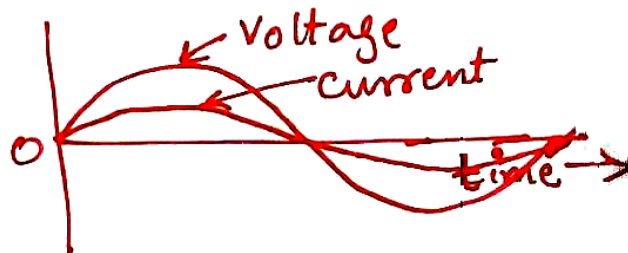
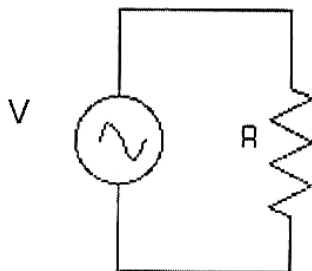
1. Physical inspection required before installation.
2. Switch off power supply while working with the transformer.
3. Use insulative equipment like gloves rubber shoe and keep all the standard setup by manufacturer.
4. Keep all the smaller objects away from the work place, so that they do not fall inside the transformer.
5. Ensure transformer must be grounded before providing supply.
6. Place transformer in such a way that it will always be dry.
7. Keep people away by putting danger sign.

15. Main components of immersion heater

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1. Metal body of water-heater – Molded in shape of U-shaped.
2. Terminal housing – made of Ebonite or Bakelite to hold terminals.
3. Rubber Band for cord to protect the cord from being damaged.
4. Three core cord for supply.
5. 3 Pin plug to give supply.
6. Terminals with screws and housing screws to tight the wire ends and terminal housing cover.

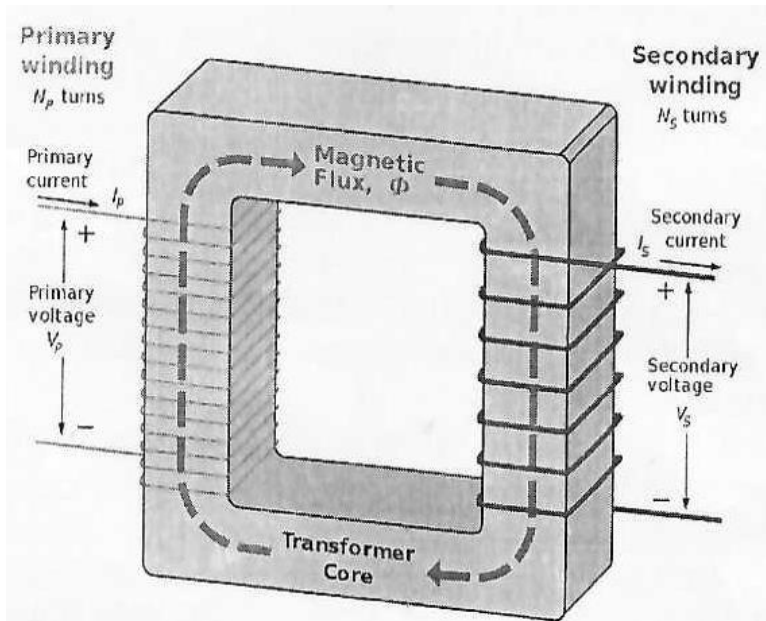
16.



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17. An elementary transformer consists of soft iron or silicon steel core and two winding. The winding is insulated from the core. The core lamination provides a path of low reluctance. Lamination of core is used to reduce eddy current loss to the magnetic flux. Energy may be efficiently transferred by induction from one set of coils to another by means of a varying magnetic flux. The EMF are induced by the variation in the magnitude of flux with time. The frequency of induced EMF is same as that of frequency of flux or that of supply voltage.

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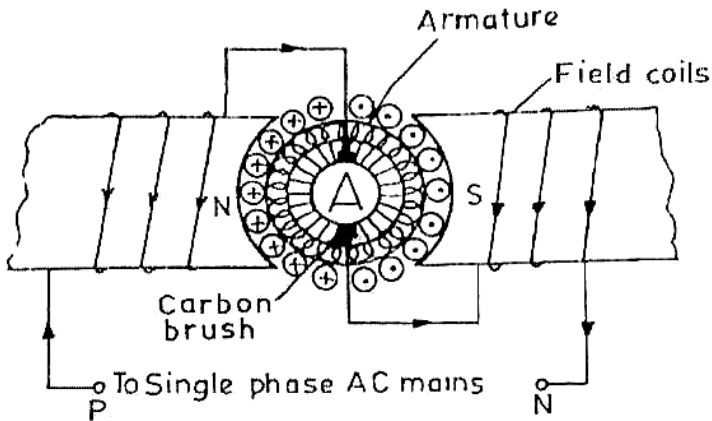


18. **Universal motors**

These motors are exactly same as D.C. series motors. They can be operated both on A.C. (Single Phase) and D.C supply. In these motors, the field and the armature are connected in series with each other. For changing the directions of rotation either armature or field connections are changed. The principle of this motor is the same as that of D.C series motor. The speed of universal motor is inversely proportional to the load i.e. at high load, its speed is low but at small load, its speed is high. The torque of this motor is directly proportional to the current taken by the motor. The motor is started on putting the load. The starting device used with this type of motor is auto-transformer with the help of which the

voltage is raised on the motor gradually so that the motor is saved from high starting current.

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19. DC motor starter

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The current at the time of starting is very high and many times of the rated load current. This excessive current may damage the motor due to the excessive heat and short circuit which result in the damage of brushes, commutator and winding etc.

To avoid this stage we require a starter for starting period third stage decoration i.e. when motor runs with rated speed and back EMF is developed. Starter is necessary.

- (i) To control the starting current up to safe value.
- (ii) To protect the motor against the damage brushes, commutator and winding.

To protect the motor with this excessive current, we have to increase the armature circuit resistance we add a variable resistance in series with armature.

DC motor starter consists of starting resistance which is properly graded. In addition to starting resistance there are some protective devices like no volt release and overload release. The starting resistance cut out in the steps till the motor gets its rated speed.

20. Types of Dynamometer Wattmeter :

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Dynamometer wattmeters may be divided into two classes :

1. Suspended-coil Torsion Wattmeters : These instruments are used largely as standard wattmeters.
2. Pivoted-coil Direct-indicating Wattmeters : These instruments are commonly used as a switchboard or portable instruments.

Advantages :

1. In dynamometer type wattmeter, the scale of the instrument is uniform (because deflecting torque is proportional to the true power in both DC as well as AC and the instrument is spring controlled.)
2. High degree of accuracy can be obtained by careful design; hence these are used for calibration purposes.

Disadvantages :

1. The error due to the inductance of the pressure coil at low power factor is very serious (unless special features are incorporated to reduce its effect)
2. In dynamometer type wattmeter, a stray field may affect the reading of the instrument. To reduce it, magnetic shielding is provided by enclosing the instrument in an iron case.

21. Capacitor start motor :

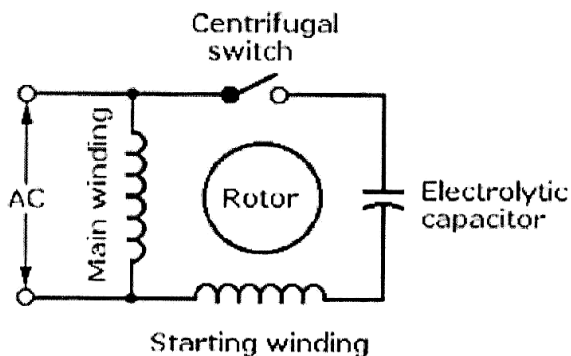
It is the modified form of a split phase motor (resistance start). A capacitor is also inserted in series with auxiliary winding.

The capacitor is electrolytic capacitor. It is a short duty type and guaranteed for 20 operations per hour. The value of a capacitor ranges from 50 to a few hundred. Capacitor is usually mounted in a metal casing on the top of the motor enclosure

with the help of capacitor the angle between current in main winding I_m and current in a starting winding I is improved to nearly 90 degree.

The torque is directly proportional to \sin . So in capacitor start motor the starting torque is increased. Generally torque of the capacitor start motor is approximately double of the torque of the split phase motor. When the motor gets the rated Speed the auxiliary winding and switch are automatically disconnected by centrifugal switch.

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22. To help prevent manual handling injuries in the workplace, you should avoid such tasks as far as possible. However, where it is not possible to avoid handling a load, employers must look at the risks of that task and put sensible health and safety measures in place to prevent and avoid injury.

For any lifting activity

Always take into account:

- individual capability
- the nature of the load
- environmental conditions
- training
- work organisation

If you need to lift something manually

- Reduce the amount of twisting, stooping and reaching
- Avoid lifting from floor level or above shoulder height, especially heavy loads
- Adjust storage areas to minimise the need to carry out such movements
- Consider how you can minimise carrying distances
- Assess the weight to be carried and whether the worker can move the load safely or needs any help – maybe the load can be broken down to smaller, lighter components

If you need to use lifting equipment

- Consider whether you can use a lifting aid, such as a forklift truck, electric or hand-powered hoist, or a conveyor
- Think about storage as part of the delivery process – maybe heavy items could be delivered directly, or closer, to the storage area
- Reduce carrying distances where possible

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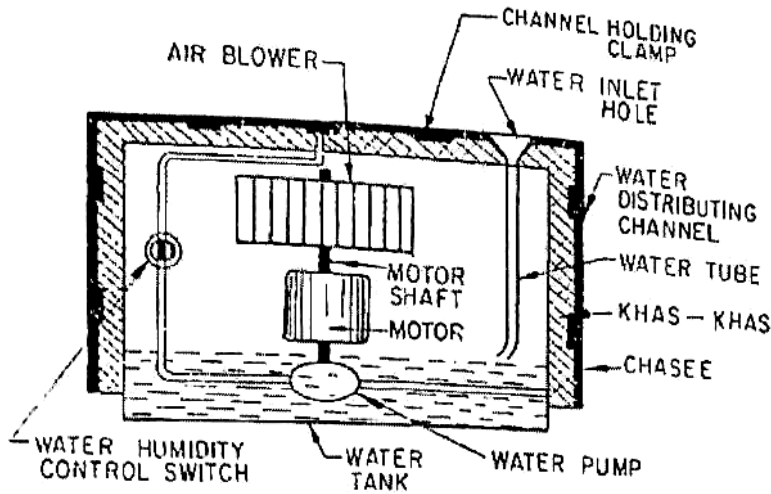
23. Room cooler

It is used to supply cool air in the hot season. The room cooler consists for two speed capacitor start or capacitor-run type motor having extended shafts on both sides. The motor is fitted vertically in the water tank of room cooler. On the top of motor shaft, a air blower is fitted which throws cool air through grill provided in the front of room cooler after sucking from outside through khas-has matting and on the bottom of motor shaft a small water pump is tithed which pump sweater from water tank OT distributing channel fitted on the top of 'wood wool pads' or 'khas-khas matting'. The water from the holes of distributing channel drops on the khas-khas matting and keep it moistened from top to bottom that is why the cool air can be changed according to the choice by the help of guide vanes which are provided on the front chase of the cooler. The speed of the motor or blower can be controlled by the select switch fitted in the front panel of cooler. When the switch knob is kept on 'High' position, whole of the voltage is applied across running winding and capacitor gets nearly double supply voltage due to transformer action of the auxiliary winding along with running winding and high action of the auxiliary winding along with running winding and high speed of the motor is obtained and we get more cool air from the blower. When the switch

knob is kept on 'Low' position, voltage across the running winding is reduced which reduces the speed of the motor and blower throws less cool air out of the grill. The water level of the water in the wait tank of the panel which indicates the level of the water in the water tank of the cooler.

The humidity control valve also provided to regulate the quantity of waterfed to distributing channel. On the top of the chase of the cooler a hole is provided to drain out the water from the water tank when the cooler is not be used for a long time.

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24. The principle of working of 3 phase induction motor is mutual induction. Here supply is not directly given to the rotor. When the three phase stator winding of an induction motor is fed from a three phase A.C supply, a magnetic flux is set up in the stator windings. This magnetic flux is of constant magnitude but rotating round the air gap at synchronous speed (N_s). This rotating magnetic flux passes through the air gap and cuts the rotor conductors which are stationary. Therefore, an emf will be induced in the rotor conductors. As the rotor forms a closed circuit, a current will flow and hence a torque is produced in the rotor. According to Lenz's law, the induced emf always opposes the cause which produces it. Here the cause is the relative speed between magnetic field and the rotor. Hence to reduce the relative speed, the rotor start to rotate in the same direction as that of the magnetic flux and tries to catch up the rotating magnetic field. But the rotor never catches up the speed of the rotating magnetic field and only rotates at a speed less than the synchronous speed.

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Advantages :

- (i) It has simple and rugged construction.
- (ii) It is relatively cheap.
- (iii) It requires little maintenance.
- (iv) It has high efficiency and reasonably good power factor.
- (v) It has self starting torque.