व्यवसाय विद्युतकार (प्रथम वर्ष) प्रयोगात्मक पाठ्यक्रम :–

1. कुल घण्टे — 826
2. कुल अभ्यास — 106

आई०टी०आई० के लिए

1. 455 घण्टे = 55.08 %
2. 69 अभ्यास = 65.00 %

डी०एस०टी० के लिए

1- 371 घण्टे = 44.91 %
2. 37 अभ्यास = 34.90 %

व्यवसाय विद्युतकार (द्वितीय वर्ष) प्रयोगात्मक पाठ्यक्रम :–

1. कुल घण्टे — 837
2. कुल अभ्यास — 96

आई०टी०आई० के लिए

1. 460 घण्टे = 54.95 %
2. 55 अभ्यास = 57.29 %

डी०एस०टी० के लिए

1. 377 घण्टे = 45.04 %
2. 41 अभ्यास = 42.70 %

सदस्य (कौशल किशोर)

सदस्य (आर०पी०पांडे)

सदस्य (जगत सिंह)

ग्रुप लीडर (मोहन सिंह मेहरा)

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DST SYLLABUS FOR ELECTRICIAN TRADE

FIRST YEAR

Duration	Reference Learning Outcome	Sl NO.	Professional Skill (Trade Practical) with Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 160 Hrs. Professional Knowledge 36 Hrs	Verify characteristics of electrical and magnetic circuits. (Mapped NOS: PSS/N6001, PSS/N6003)	1- 2- 3- 4- 5- 6- 7-	**45.** Measure current, voltage and PF and determine the characteristics of RL, RC and RLC in AC series circuits. (06Hrs.) **46.** Measure the resonance frequency in AC series circuit and determine its effect on the circuit. (05hrs.) **47.** Measure current, voltage and PF and determine the characteristics of RL, RC and RLC in AC parallel circuits. (06Hrs.) **48.** Measure the resonance frequency in AC parallel circuit and determine its effects on the circuit. (05hrs.) **49.** Measure power, energy for lagging and leading power factors in single phase circuits and compare characteristic graphically. (06Hrs.) **50.** Measure Current, voltage, power, energy and power factor in three phase circuits. (05hrs.) **51.** Practice improvement of PF by use of capacitor in three phase circuit.(03Hrs.)	Inductive and capacitive reactance, their effect on AC circuit and related vector concepts. Comparison and Advantages of DC and AC systems. Related terms frequency, Instantaneous value, R.M.S. value Average value, Peak factor, form factor, power factor and Impedance etc. Sine wave, phase and phase difference. Active and Reactive power. Single Phase and three-phase system. Problems on A.C. circuits. (10 hrs.)
		8- 9- 10- 11- 12-	**52.** Ascertain use of neutral by identifying wires of a 3- phase 4 wire system and find the phase sequence using phase sequence meter. (07Hrs.) **53.** Determine effect of broken neutral wire in three phase four wire system.(04hrs.) **54.** Determine the relationship between Line and Phase values for star and delta connections. (07Hrs.) **55.** Measure the Power of three phase circuit for balanced and unbalanced loads. (10Hrs.) **56.** Measure current and voltage of two phases in case of one phase is shortcircuited in three phase four wire system and compare with healthy system. (07hrs.)	Advantages of AC poly-phase system. Concept of three-phase Star and Delta connection. Line and phase voltage, current and power in a 3 phase circuits with balanced and unbalanced load. Phase sequence meter. (10 hrs.)
Professional Skill 200 Hrs.;	Estimate, Assemble, install and test wiring	13-	**62.** Identify various conduits and different electrical accessories. (8 Hrs.)	I.E. rules on electrical wiring. Types of

Professional Knowledge 42 Hrs.	system. (Mapped NOS: PSS/N6001)	14- 15-	**63.** Practice cutting, threading of different sizes & laying Installations. (17 Hrs.) **64.** Prepare test boards / extension boards and mount accessories like lamp holders, various switches, sockets, fuses, relays, MCB, ELCB, MCCB etc. (25 Hrs.)	domestic and industrial wirings. Study of wiring accessories e.g. switches, fuses, relays, MCB, ELCB, MCCB etc. Grading of cables and current ratings. Principle of laying out of domestic wiring. Voltage drop concept. (14 Hrs.)
		16- 17- 18- 19-	**65.** Draw layouts and practice in PVC Casing-capping, Conduit wiring with minimum to more number of points of minimum 15 mtr length. (15 Hrs.) **66.** Wire up PVC conduit wiring to control one lamp from two different places. (15 Hrs.) **67.** Wire up PVC conduit wiring to control one lamp from three different places. (15 Hrs.) **68.** Wire up PVC conduit wiring and practice control of sockets and lamps in different combinations using switching concepts. (15 Hrs.)	PVC conduit and Casing capping wiring system. Different types of wiring - Power, control, Communication and entertainment wiring. Wiring circuits planning, permissible load in subcircuit and main circuit. (14 Hrs.)
		20- 21- 22- 23- 24- 25-	**69.** Wire up the consumers main board with MCB & DB's switch and distribution fuse box. (15 Hrs.) **70.** Prepare and mount the energy meter board. (15 Hrs.) **71.** Estimate the cost/bill of material for wiring of hostel/ residential building and workshop. (15 Hrs.) **72.** Practice wiring of hostel and residential building as per IE rules. (15 Hrs.) **73.** Practice wiring of institute and workshop as per IE rules. (15 Hrs.) **74.** Practice testing / fault detection of domestic and industrial wiring installation and repair. (15Hrs.)	Estimation of load, cable size, bill of material and cost. Inspection and testing of wiring installations. Special wiring circuit e.g. godown, tunnel and workshop etc. (14 Hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 10Hrs.	Plan and prepare Earthing installation. (Mapped NOS: PSS/N6002)	26- 27- 28-	**75.** Prepare pipe earthing and measure earth resistance by earth tester / megger. (10 Hrs.) **76.** Prepare plate earthing and measure earth resistance by earth tester / megger. (10 Hrs.) **77.** Test earth leakage by ELCB and relay. (5 Hrs.)	Importance of Earthing. Plate earthing and pipe earthing methods and IEE regulations. Earth resistance and earth leakage circuit breaker. (5 Hrs.)

rofessional Skill 75 Hrs.; Professional Knowledge 12 Hrs.	Execute testing, evaluate performance and maintenance of transformer. (Mapped NOS: PSS/N2406, PSS/N2407)	29- 30- 31- 32- 33-	**98.** Verify terminals, identify components and calculate transformation ratio of single-phase transformers. (8 Hrs.) **99.** Perform OC and SC test to determine and efficiency of single-phase transformer. (12Hrs.) **100.** Determine voltage regulation of single-phase transformer at different loads and power factors. (12 Hrs.) **101.** Perform series and parallel operation of two single phase transformers. (12 Hrs.) **102.** Verify the terminals and accessories of three phase transformer HT and LT side. (6Hrs.)	Working principle, construction and classification of transformer. Single phase and three phase transformers. Turn ratio and e.m.f. equation. Series and parallel operation of transformer. Voltage Regulation and efficiency. Auto Transformer and instrument transformers (CT & PT). (12 Hrs.)
		34- 35- 36- 37-	**103.** Perform 3 phase operation (i) delta-delta, (ii) delta-star, (iii) star-star, (iv) star-delta by use of three single phase transformers. (6 Hrs.) **104.** Perform testing of transformer oil. (6 Hrs.) **105.** Practice on winding of small transformer. (8 Hrs.) **106.** Practice of general maintenance of transformer. (5 Hrs.)	Method of connecting three single phase transformers for three phase operation. Types of Cooling, protective devices, bushings and termination etc. Testing of transformer oil. Materials used for winding and winding wires in small transformer. (06 Hrs.)

DST SYLLABUS FOR ELECTRICIAN TRADE

SECOND YEAR

Duration	Reference Learning Outcome	Sl. No.	Professional Skill (Trade Practical) with Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 80 Hrs.; Professional Knowledge 26 Hrs.	Plan, Execute commissioning and evaluate performance of AC motors. (Mapped NOS: PSS/N1709) Execute testing, and maintenance of AC motors and starters. (Mapped NOS: PSS/N1709)	1- 2- 3- 4-	**123.** Identify parts and terminals of three phase AC motors. (5 Hrs.) **124.** Make an internal connection of automatic star-delta starter with three contactors. (10 Hrs.) **125.** Connect, start and run three phase induction motors by using DOL, star delta and auto-transformer starters. (17 Hrs.) **126.** Connect, start, run and reverse direction of rotation of slip-ring motor through rotor resistance starter and determine performance characteristic. (13 Hrs.)	Working principle of three phase induction motor. Squirrel Cage Induction motor, Slip-ring induction motor; construction, characteristics, Slip and Torque. Different types of starters for three phase induction motors, its necessity, basic contactor circuit, parts and their functions. (13 Hrs.)
		5- 6- 7- 8- 9-	**127.** Determine the efficiency of squirrel cage induction motor by brake test. (05 Hrs.) **128.** Determine the efficiency of three phase squirrel cage induction motor by no load test and blocked rotor test. (05 Hrs.) **129.** Measure slip and power factor to draw speedtorque (slip/torque) characteristics. (10 Hrs.) **130.** Test for continuity and insulation resistance of three phase induction motors. (5 Hrs.) **131.** Perform speed control of three phase induction motors by various methods like rheostatic control, autotransformer etc. (10 Hrs.)	Single phasing prevention. No load test and blocked rotor test of induction motor. Losses & efficiency. Various methods of speed control. Braking system of motor. Maintenance and repair. (13 Hrs.)
Professional Skill 23 Hrs.; Professional Knowledge 09 Hrs.	Distinguish, organise and perform motor winding. (Mapped NOS: PSS/N4402)	10- 11-	**132.** Perform winding of three phase AC motor by developing connection diagram, test and assemble. (18 Hrs.) **133.** Maintain, service and troubleshoot the AC motor starter. (05 Hrs.)	Concentric/ distributed, single/ double layer winding and related terms.
Professional Skill 82 Hrs.; Professional Knowledge 24 Hrs.	Assemble accessories and carry out wiring of control cabinets and equipment.	12-	**167.** Design layout of control cabinet, assemble control elements and wiring accessories for: (i) Local and remote control of induction motor. (09 Hrs.)	Study and understand Layout drawing of control cabinet, power and control circuits. Various control elements: Isolators,

			(II) Forward and reverse operation of Induction motor. (09 Hrs.) (III) Automatic star-delta starter with change of direction of rotation. (12 Hrs.) (iv) Sequential control of three motors. (09 Hrs.)	pushbuttons, switches, indicators, MCB, fuses, relays, timers and limit switches etc. (12 Hrs.)
		13- 14- 15- 16-	**168.** Carry out wiring of control cabinet as per wiring diagram, bunching of XLPE cables, channeling, tying and checking etc. (13 Hrs.) **169.** Mount various control elements e.g. circuit breakers, relays, contactors and timers etc. (09 Hrs.) **170.** Identify and install required measuring instruments and sensors in control panel. (09 Hrs.) **171.** Test the control panel for its performance. (12 Hrs.)	Wiring accessories: Race ways/ cable channel, DIN rail, terminal connectors, thimbles, lugs, ferrules, cable binding strap, buttons, cable ties, sleeves, gromats and clips etc. Testing of various control elements and circuits. (12 Hrs.)
Professional Skill 50 Hrs.; Professional Knowledge 11 Hrs.	Perform speed control of AC and DC motors by using solid state devices.	17- 18- 19-	**172.** Perform speed control of DC motor using thyristors / DC drive. (18 Hrs.) **173.** Perform speed control and reversing the direction of rotation of AC motors by using thyristors / AC drive. **174.** Construct and test a universal motor speed controller using SCR. (14 Hrs.)	Working, parameters and applications of AC / DC drive. Speed control of 3 phase induction motor by using VVVF/AC Drive. (11 Hrs.)
Professional Skill 23 Hrs.; Professional Knowledge 04 Hrs.	Erect overhead domestic service line, outline various power plant layout and explain smart distribution grid and its components. (Mapped NOS: PSS/N0106)	20- 21- 22- 23-	**181.** Draw layout of thermal power plant and identify function of different layout elements. (5 Hrs.) **182.** Draw layout of hydel power plant and identify functions of different layout elements. (5 Hrs.) **183.** Visit to transmission / distribution substation. (08 Hrs.) **184.** Draw actual circuit diagram of substation visited and indicate various components. (5 Hrs.)	Conventional and nonconventional sources of energy and their comparison. Power generation by thermal and hydel power plants. (04 Hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 07 Hrs.	Plan, assemble and install solar panel.	24- 25- 26-	**185.** Prepare layout plan and Identify different elements of solar power system. (05 Hrs.) **186.** Prepare layout plan and Identify different elements of wind power system. (05 Hrs.) **187.** Assemble and connect solar panel for illumination. (15 Hrs.)	Various ways of electrical power generation by non-conventional methods. Power generation by solar and wind energy. Principle and operation of solar panel. (07 Hrs.)
Professional Skill 50 Hrs.; Professional Knowledge 10 Hrs.	Erect overhead domestic service line, outline various power plant layout and explain smart distribution grid	27- 28-	**188.** Practice installation of insulators used in HT/LT line for a given voltage range. (04hrs.) **189.** Draw single line diagram of transmission and distribution system. (04Hrs.)	Transmission and distribution networks. Line insulators, overhead poles and method of joining aluminum conductors. (05 Hrs.)

	and its components. (Mapped NOS: PSS/N0106)	29- 30-	**190.** Measure current carrying capacity of conductor for given power supply. (04hrs.) **191.** Fasten Jumper In pin, shackle and suspension type Insulators. (07Hrs.)	
		31- 32- 33-	**192.** Erect an overhead service line pole for single phase 230V distribution system in open space. (10 Hrs.) **193.** Practice on laying of domestic service line. (10 Hrs.) **194.** Install bus bar and bus coupler on LT line. (5 Hrs.)	Safety precautions and IE rules pertaining to domestic service connections. Various substations. Various terms like – maximum demand, average demand, load factor, diversity factor, plant utility factor etc. (05 Hrs.)
Professional Skill 25 Hrs.; Professional Knowledge 04 Hrs.	Examine the faults and carry out repairing of circuit breakers. (Mapped NOS: PSS/N7001	34- 35- 36- 37- 38-	**195.** Identify various parts of relay and ascertain the operation. (5 Hrs.) **196.** Practice setting of pick up current and time setting multiplier for relay operation. (5 hrs.) **197.** Identify the parts of circuit breaker, check its operation. (5Hrs.) **198.** Test tripping characteristic of circuit breaker for over current and short circuit current. (5 hrs.) **199.** Practice on repair and maintenance of circuit breaker. (5 hrs.)	Types of relays and its operation. Types of circuit breakers, their applications and functioning. Production of arc and quenching. (04 Hrs)
Professional Skill 22 Hrs.; Professional Knowledge 04 Hrs.	Install and troubleshoot Electric Vehicle charging stations.	39- 40- 41-	**200.** Demonstrate different charger specifications. (05 hrs) **201.** Perform installation of EV charging Station for Public places. (10 hrs) **202.** Perform installation of Home EV charging stations. (10 hrs	EV scenario in India and EV Charging basic theory. EV Charging safety requirements. (04 Hrs)

सदस्य सदस्य सदस्य ग्रुप लीडर

(कोहरम कनवाल) (आर०पी० पांडे) (जगत सिंह) (मोहन सिंह गोहा)