PUBLIC WORKS DEPARTMENT

DEPARTMENTAL EXAMINATION OF OVERSEER (ELECTRICAL ENGINEER) UNDER P.W.D., 2024

ENGINEERING PAPER

(100 MARKS)

Signature of Invigilator _____

CODE NO.

(For Official use)

Subject	Marks carried by each question	No. of correct answers	Marks
Detail Study of Internal Electrification System used in PWD	1		
Maintenance - Fault Diagnosis	1		
Generator Set and Transformers	1		
Electrical Measuring Instruments	1		
AirConditioning and Refrigeration	1		
Lift/Elevator	1		
Estimating and Costing	10		

Signature of Examiner_____

Signature of Scrutiniser _____

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DEPARTMENTAL EXAMINATION OF OVERSEER (ELECTRICAL ENGINEER) UNDER P.W.D., 2024

ENGINEERING PAPER

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Roll No. _____

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PUBLIC WORKS DEPARTMENT
DEPARTMENTAL EXAMINATION OF OVERSEER (ELECTRICAL ENGINEER), 2024

Engineering Paper

Time allowed : 3 hours **Full Marks : 100**
Pass Marks : 40

Section - A

I. Choose the correct answer (Each question carries 1 mark)
(Put a tick mark (✓) against the correct answer in the bracket ( )

1) The Inverse Square laws of illuminations (where E is illuminance, I is the luminous intensity in a given direction and d is the distance between the source and plane.) are as follow
(a) $E = I/d^2$ ( ) (b) $D= E^2/I$ ( )
(d) $I= D^2/E$ ( ) (d) None of the above ( )

2) The illumination level required for each room of the building is calculated in the following formula {where Illumination level (IL)is Room size (RS) X Depreciation factor (DF) X Standard lumens (LM)/Utilization factor (UF)}
(a) IL= (RS x SL x DF)/UF ( ) (b) IL = (RS x SL x UF)/DF ( )
(c) IL=(SL x DF x UF)/RS ( ) (d) IL = RS x SL x DF x UF ( )
(e) None of the above

3) The lumens level (lumens /meter) required for a reading room is
(a) 200 ( ) (b) 250 ( )
(c) 300 ( ) (d) 350 ( )
(e) None of the above

4) The lumens levels is effected by the followings
(a) Temperatures of the room ( ) (b) Thickness of wall ( )
(c) Materials used in slab/roof/wall ( ) (d) Colours of the room ( )
(f) None of the above

5) The foundation of Electrical Engineer works in Lighting is depended upon: -
(a) Size of the Copper wire ( ) (b) Main switches ( )
(c) L.T Panel Board ( ) (d) Illumination level calculation ( )
(f) None of the above

6) In normal working condition, the depreciation factor value will be: -
(a) 1.2 ( ) (b) 1.0 ( )
(c) 0.8 ( ) (d) 0.7 ( )
(e) 0.6 ( ) (f) None of the above ( )

7) In a normal working conditions, The utilization factor value will be:-
(a) 1.2 ( ) (b) 1.0 ( )
(c) 0.8 ( ) (d) 0.7 ( )
(e) None of the above

8) Double height of the building room Ceiling will affect in: -

(a) Utilization factor ( ) (b) Depreciation factor ( )
(c) Lighting position ( ) (d) Colour of the room ( )
(e) None of the above ( )

9) The illumination levels are measured by the used of:

(a) Multi-meter ( ) (b) Voltmeter ( )
(c) Ammeter ( ) (d) Lux meter ( )
(e) None of the above ( )

10) The efficiency of Electrical luminaires is measured in: -

(a) Lux/Meter ( ) (b) Lux/Watts ( )
(c) Lux/weight ( ) (d) Lux/colour ( )
(e) None of the above ( )

11) Electrical Plan drawing used to be drawn on the Architectural drawing of

(a) Detailed Drawing ( ) (b) Side elevation drawing ( )
(c) Plan drawing ( ) (d) Not base on Architectural drawing ( )
(e) None of the above ( )

12) In Electrical Plan drawing the following is included the following locations:

(a) Switch board ( ) (b) Lighting/luminaires ( )
(c) Main switch/LT Panel ( ) (d) MCB DB/DB ( )
(e) All of the above ( )

13) In Electrical plan drawings the luminaires/light fittings must be placed; -

(a) Near ceiling Fan where the blade abstracts the light ( )
(b) Above ceiling Fan where the blade abstracts the light ( )
(c) In the corner of the room(where not visible from all room) ( )
(d) In the center of the room or where the efficiency of light utilized in the room or evenly distributed in the room ( )
(e) None of the above ( )

14) All Junior Engineer/Electrician/wireman must have a skilled to write and read the following drawings:

(a) Electrical Plan drawing ( ) (b) Electrical Circuit Diagram ( )
(c) Architect Plan drawing ( ) (d) Power flow diagram ( )
(e) All of the above ( )

15) Electrical Circuit diagram are always drawn in:-

(a) Single line diagram (SLD) ( ) (b) Two-dimensional drawing ( )
(c) Three-Dimensional drawing ( ) (e) Simple plan drawing ( )
(f) None of the above ( )

16) Type of earthing successfully utilized with good result in hilly areas like Mizoram:-

(a) Chemical Earthing ( ) (b) Copper Plate Earthing ( )
(c) G.I Plate Earthing ( ) (d) G.I Pipe Earthing ( )
(e) None of the above ( )

17) What type of Earthing which does not required maintenance like watering etc.

(a) Chemical Earthing ( ) (b) Copper Plate Earthing ( )
(c) G.I Plate Earthing ( ) (d) G.I Pipe Earthing ( )
(e) None of the above ( )

18) Type of Lightning arrestor successfully utilized with good result in hilly areas like Mizoram
(a) Early Seamer Electrode (ESE) Lightning arrestor ( )
(b) Copper five finger system ( )
(c) Copper one finger system ( )
(d) Steel/Aluminum five finger system ( )
(e) None of the above ( )

19) Lightning arrestor depend upon; -
(a) Good Earthing ( ) (b) Strong structure ( )
(c) Location of the building ( ) (d) Elevation of the buildings ( )
(e) None of the above ( )

20) Electrical Shock will be prevented by:
(a) Good Earthing of the system ( ) (b) Size of the wire ( )
(d) L.T Panel ways ( ) (e) Load of the building ( )
(f) None of the above ( )

21) Surge current will be prevented by
(a) MCB ( ) (b) Main switch ( )
(c) DB ( ) (d) MCCB ( )
(e) None of the above ( )

22) Surge Voltage will be prevented by:
(a) MCB ( ) (b) MCCB ( )
(c) ELCB ( ) (d) RCCB ( )
(e) Voltage regulator/over/under voltage and overload protector ( )
(f) None of the above ( )

23) Life span of conceal wiring is about: -
(a) 100 years ( ) (b) 200 years ( )
(c) 50 years ( ) (d) 25 years ( )
(e) None of the above ( )

24) Casing Capping wiring is surface type of wiring and it is: -
(a) Permanent type of wiring ( ) (b) Permanent but temporary by nature ( )
(c) Temporary but Permanent by Nature ( ) (d) Temporary type of wiring ( )
(e) None of the above ( )

25) The best material for conceal wiring pipe is
(a) UPVC Conduit pipe ( ) (b) Heavy Duty PVC Pipe ( )
(c) Medium Duty PVC pipe ( ) (d) Steel Conduit pipe ( )
(e) G.I Conduit pipe ( ) (f) All of the above ( )

26) The best copper wire for electrical wiring is
(a) FR Copper wire ( ) (b) FRLS&H copper wire ( )
(c) HFFR Copper wire ( ) (d) Aluminum wire ( )
(e) All of the above ( )

27) The voltage grade of PWD approve copper wires is
(a) 650 volts ( ) (b) 440 Volts ( )
(c) 250 Volts ( ) (d) 230 Volts ( )
(e) 1100 Volts ( ) (f) None of the above ( )

28) The Voltage grade for single phase system in India is;

(a) 120 Volts	( )	(b) 230 Volts	( )
(c) 250 Volts	( )	(d) 415 Volts	( )
(e) 440 volts	( )	(f) None of the above	( )

29) The Voltage grade for Three phase system in India is;

(a) 1100 Volts	( )	(b) 230 Volts	( )
(c) 250 Volts	( )	(d) 415 Volts	( )
(e) 440 volts	( )	(f) None of the above	( )

30) In the Latest CPWD Electrical specification, the earth wire in the wiring

(a) Same size as phase and neutral wire ( )
(b) Two wires of the same size in the three phases ( )
(c) Must reach the light point with phase and neutral wires ( )
(d) Must be loop in the switch board as phase and neutral wires ( )
(e) Must not be bare wires ( )
(f) All of the above ( )

31) In a three-phase wiring, the voltage become very high as high as 390 volts in single phase all the fixtures and appliances are burning due to high voltage, the connection voltages are fine i.e 415 Volts in three phase and 230 volts in single phase what will be the faulty in your electrical wiring system

(a) One number of RYB phase is faulty ( )
(b) Earthing system faulty ( )
(c) L.T Panel board faulty ( )
(d) Neutral link in the L.T Panel or MDB/DB faulty ( )
(e) Main to Sub-Main wiring faulty ( )
(f) None of the above ( )

32) Whenever you switch on high load like Geyser/AC and other appliances, your whole voltages use to fluctuated in each and every time, what will be the faulty in your wiring

(a) Wire sizes in the wiring is under size ( )
(b) Wire size in the wiring is in standard size ( )
(c) Wire size in the wiring is in over size ( )
(d) Wiring system faulty ( )
(c) None of the above ( )

33) Whenever you switch on your ceiling fan it cannot start by itself and required to be running by manual, what will be the faulty on ceiling fan

(a) Winding faulty	( )	(b) Regulator faulty	( )
(c) Earth leakage	( )	(d) Capacitor faulty	( )
(f) Blades faulty	( )	(g) None of the above	( )

34) In a power plug/Light plug and A/C/Geyser Plug wiring the phase have to be connected only on the

(a) Right side of the plug socket	( )	(b) Left side of the plug socket	( )
(c) Both side of the plug socket	( )	(d) In the third pin of the socket	( )
(d) None of the above	( )		

35) Green colour of wire is meant for

(a) Phase wire ( ) (b) Neutral wire ( )
(c) Earth wire ( ) (d) Can be used for all phase, neutral and earth ( )
(e) None of the above ( )

36) Black colour of wire is meant for

(a) Phase wire ( ) (b) Neutral wire ( )
(c) Earth wire ( ) (d) Can be used for all phase, neutral and earth ( )
(f) None of the above ( )

37) The right way of connection Polarized MCB Normal is

(a) Incoming at the top(load) and out-going at the bottom (line) ( )
(b) Incoming at the bottom(line) and out-going at the top(load) ( )
(c) Can be connected both sides ( )
(d) Polarity does not effect ( )
(e) None of the above ( )

38) The right way of connection Non-Polarized MCB Normal is

(a) Incoming at the top (load) and out-going at the bottom (line) ( )
(b) Incoming at the bottom (line) and out-going at the top(load) ( )
(c) Can be connected both sides ( )
(d) Polarity does not effect ( )
(e) (c) & (d) ( )

39) Which part of the appliances/Electrical Machines must earth properly to avoid electrical shock

(a) Metal body of the appliances ( )
(b) Neutral of the appliances ( )
(c) Phase of the appliances ( )
(d) Only the non-metallic parts of the body ( )
(e) None of the above ( )

40) The safety factor normally practice in light load wiring system is around:-

(a) 100% safety ( ) (b) 200% safety ( )
(c) 300% safety ( ) (d) 400% safety ( )
(e) None of the above ( )

41) Generator transformers are:

(a) Step-up transformers ( ) (b) Step-down transformers ( )
(c) Auto-transformers ( ) (d) One-one transformers ( )
(e) None of the above ( )

42) Which of the following is one of the criteria of selecting particular generator transformer?

(a) Low HV voltage ( ) (b) Low LV currents ( )
(c) High impedance ( ) (d) On-load tap-changer ( )
(e) None of the above ( )

43) Generator transformers can undergo sudden load-changes.

(a) True ( ) (b) False ( )
(c) None of the above ( )

44) Station transformers are generally used for :
(a) Providing generator voltage to transmission ( )
(b) Providing power to load from transmission ( )
(c) Isolating DC ( )
(d) To supply power section auxiliary ( )
(e) None of the above ( )

45) Which of the following does not follow the criteria of station transformer?
(a) LV at 11 kV ( ) (b) HV at 275-400 kV ( )
(c) Low impedance ( ) (d) On-load tap-changer required ( )
(e) None of the above ( )

46) Operating load factor of station transformer must be :
(a) Low ( ) (b) High ( )
(c) Zero ( ) (d) Infinite ( )
(e) None of the above ( )

47) For a unit transformer HV voltage must be :
(a) 400 kV ( ) (b) 200 kV ( )
(c) 24 kV ( ) (d) 100 kV ( )
(e) None of the above ( )

48) What voltage of On-load tap-changer is required for unit transformer?
(a) 11 kV ( ) (b) 23 kV ( )
(c) 400 kV ( ) (d) Not required ( )
(e) None of the above ( )

49) What is the primary function of a Diesel Generating Set
(a) To purify water ( ) (b) To cool the environment ( )
(c) To produce electricity ( ) (d) To generate heat ( )
(e) None of the above ( )

50) Which component of a Diesel Generating set converts mechanical energy into electrical energy
(a) Turbocharger ( ) (b) Radiator ( )
(c) Alternator ( ) (d) Fuel tank ( )
(e) None of the above ( )

51) Permanent magnet moving coil ammeter :
(a) Is used for measuring of direct current ( )
(b) Is used for the measurement of both alternating and direct currents ( )
(c) Produces torque for deflection of pointer proportional to I^2 where I is the total current flow in the circuit in amperes ( )
(d) Is used for measurement of alternating current ( )
(e) None of the above ( )

52) The braking system of an energy meter :
(a) Makes use of magnet for reducing rotation of aluminium disc ( )
(b) Makes use of temporary magnet which is adjustable ( )
(c) Also record the number of rotation in aluminium disc ( )
(d) Makes use of temporary magnet for reducing the rotation of aluminium disc ( )
(e) None of the above ( )

53) If a 100 watts bulb is used for 10 hours, then the amount of electrical energy consumed will be :
(a) 100 watts ( ) (b) 1 KWh (1 unit of energy) ( )
(c) 1000 Watts (1KW) ( ) (d) More than one of the above ( )
(e) None of the above ( )

54) The errors in the measurement which arise due to unpredictable fluctuation in temperature and voltage supply are:
(a) Instrument errors ( ) (b) Personal errors ( )
(c) Least county errors ( ) (d) Random errors ( )
(e) All of the above ( )

55) The type of damping use for moving iron instrument is :
(a) Air friction damping ( ) (b) Fluid friction damping ( )
(c) Eddy current damping ( ) (d) Gravity friction damping ( )
(e) All of the above ( )

56) A meter read 125 V and the true value of the voltage is 125.5 V. Find the static error of the instrument.
(a) 125/0.5 V ( ) (b) 125 V ( )
(c) 0.5 V ( ) (d) 0.5/125 V ( )
(e) None of the above ( )

57) When the pointer of an indicating instrument is in motion, then the deflecting torque is opposed by:
(a) Damping torque ( ) (b) Controlling torque ( )
(c) Both damping torque and controlling torque ( ) (d) Rotating torque ( )
(e) None of the above ( )

58) A Galvanometer is used to :
(a) Detect the direction of light ( ) (b) Detect the direction of current ( )
(c) Detect the direction of magnetic induction ( ) (d) Detect the direction of sound ( )
(e) None of the above ( )

59) More power is required to operate a moving iron meter than PMMC meter because of the magnetic circuit's high.
(a) Resistance ( ) (b) Reluctance ( )
(c) Retentivity ( ) (d) Resilience ( )
(e) None of the above ( )

60) The braking torque of induction type single- phase energy meter is:
(a) Directly proportional to square of the flux ( )
(b) Directly proportional to the flux ( )
(c) Inversely proportional to the flux ( )
(d) Inversely proportional to the square of the flux ( )
(e) None of the above ( )

61) One ton of refrigeration in the S.J. unit is:
(a) 840 kJ/min ( ) (b) 420 kJ/unit ( )
(c) 21 kJ/unit ( ) (d) 210 kJ/unit ( )
(e) None of the above ( )

62) At a domestic refrigerator's back, the bank of tubes is known as:
(a) Evaporator tubes ( ) (b) Condenser tubes ( )
(c) Capillary tubes ( ) (d) Refrigerant cooling tubes ( )
(e) None of the above ( )

63) Which of these refrigerants is highly flammable and toxic?
(a) R-12 ( ) (b) Sulphur dioxide ( )
(c) Carbon dioxide ( ) (d) Ammonia ( )
(e) None of the above ( )

64) In a vapour compression cycle, where do we find the lowest temperature?
(a) Evaporator ( ) (b) Condenser ( )
(c) Expansion Valve ( ) (d) Compressor ( )
(e) None of the above ( )

65) Which of these types of compressors are used in our domestic inverter refrigerators?
(a) Rotary ( ) (b) Centrifugal ( )
(c) Piston Type Reciprocating ( ) (d) Miniature Sealed Unit ( )
(e) None of the above ( )

66) Which of these is the refrigerant that has the highest critical pressure?
(a) R-12 ( ) (b) Ammonia ( )
(c) R-11 ( ) (d) R-22 ( )
(e) None of the above ( )

67) Which is not the type of leak test for an air conditioner ?
(a) Dye testing for refrigerant leak ( ) (b) Nitrogen leak detector and bubble test ( )
(c) Magnetic leak detector ( ) (d) Electronic leak detector ( )
(e) All of the above ( )

68) Most of the changes of leakage in a split air conditioner are from :
(a) Compressor outer case joint ( ) (b) Swage Joint ( )
(c) Processing tube joint ( ) (d) Flare joint ( )
(e) None of the above ( )

69) In split AC :
(a) Compressor and condenser are part of an external unit while the evaporative coil is part of the indoor Air handling unit ( )
(b) Compressor and condenser are part of an internal unit while the evaporative coil is a part of outdoor Air handling unit ( )
(c) A single unit contains compressors, motor, connecting pipes and heat exchanger ( )
(d) Compressor in the AC installed on the unit itself ( )
(e) None of the above ( )

70) How is the condensed water drained from cassette unit ?
(a) Siphon method ( ) (b) Condensation method ( )
(c) Gravitational method ( ) (d) Pumping method ( )
(e) None of the above ( )

71) Air Conditioning involves :
(a) Control of temperature ( ) (b) Control of humidity ( )
(c) Control of air motion and air purity ( ) (d) All of these ( )
(e) None of the above ( )

72) Room air conditioner delivers conditioned air to an enclosed space without any :
(a) Fan ( ) (b) Ducts ( )
(c) Blower ( ) (d) Air filter ( )
(e) None of the above ( )

73) The co-efficient of performance of an window AC is_____ domestic refrigerator.
(a) Lower than ( ) (b) Equal to ( )
(c) More than ( ) (d) 3 times of ( )
(e) None of the above ( )

74) In split AC the indoor unit comprises of :
(a) Evaporator and blower ( )
(b) Evaporator coil, blower and capillary tube ( )
(c) Evaporator coil, blower and motor, air filter, control panel, supply and return air Grills ( )
(d) Evaporator coil, air filters, control panel, supply and return air grills, capillary tube ( )
(e) None of the above ( )

75) In which type of split AC, the indoor unit is invisible ?
(a) Ceiling mounted split unit ( ) (b) Floor mounted split unit ( )
(c) Wall mounted Split unit ( ) (d) Ductable split unit ( )
(e) None of the above ( )

76) During fire emergencies, Fire lift is used by:
(a) All persons in the building ( ) (b) Only firemen ( )
(c) VIP persons ( ) (d) Disable person ( )
(e) All of the above ( )

77) It is a vertical transport vehicle that efficiently moves people or goods between floors of a building.
(a) Escalator ( ) (b) Elevator ( )
(c) Hydraulic pump ( ) (d) Building Hoist ( )
(e) None of the above ( )

78) It is a passenger elevator which consists of a chain on open compartments (each usually designed for two persons) that move slowly in a loop up and down inside a building without stopping.
(a) Paternoster Lift ( ) (b) Pneumatic Lift ( )
(c) Hydraulic Lift ( ) (d) Escalator ( )
(e) None of the above ( )

79) These elevators utilize air pressure to lift the elevator cab. The cab has a vacuum seal built into the ceiling.
(a) Paternoster Lift ( ) (b) Pneumatic Lift ( )
(c) Hydraulic Lift ( ) (d) Escalator ( )
(e) None of the above ( )

80) These elevators which are powered by a piston that travels inside a cylinder. An electric motor pumps hydraulic oil into the cylinder to move the piston.
(a) Paternoster Lift ( ) (b) Pneumatic Lift ( )
(c) Hydraulic Lift ( ) (d) Escalator ( )
(e) None of the above ( )

81) It is a device designed to stop a descending car or counterweight beyond its normal limit and to soften the force with which the elevator runs into the pit during an emergency.
(a) Steps ( ) (b) Treads ( )
(c) Buffer ( ) (d) Counter weight ( )
(e) None of the above ( )

82) Buildings designed nowadays built vertically due to increased land cost and population.
(a) True ( ) (b) False ( )
(c) True and false ( ) (d) None of the above ( )

83) It is a type of lift (on basis of USE) that is used in offices, buildings, hotels, etc.
(a) Trade Lift ( ) (b) Hospital lift ( )
(c) Car lift ( ) (d) Good lift ( )
(e) None of the above ( )

84) It is a type of lift (on basis of USE) that is used in hospitals and treatment centres.
(a) Trade Lift ( ) (b) Hospital Lift ( )
(c) Car Lifts ( ) (d) Good lift ( )
(e) None of the above ( )

85) It is a type of lift (on basis of USE) that is used in flats and other high-rise buildings for efficient transportation of people.
(a) Trade Lift ( ) (b) Hospital Lift ( )
(c) High Residential Lift ( ) (d) Good lift ( )
(e) None of the above ( )

86) It is a type of lift (on basis of USE) that controls a system back in emergency.
(a) Fire Lift ( ) (b) Hospital Lift ( )
(c) High Residential Lift ( ) (d) Good lift ( )
(e) None of the above ( )

87) It is a type of lift (on basis of function) that is basically electro-mechanical enabled gearless traction electric technology to send people to higher buildings.
(a) Pneumatic Lift ( ) (b) Hydraulic Lift ( )
(c) Electric Lift ( ) (d) Good lift ( )
(e) None of the above ( )

88) It is a type of lift (on basis of function) that are powered by piston that travels inside a cylinder. An electric motor pumps hydraulic oil into the cylinder to move the piston. The piston smoothly lifts the elevator cab.
(a) Pneumatic Lift ( ) (b) Hydraulic Lift ( )
(c) Electric Lift ( ) (d) Good lift ( )
(e) None of the above ( )

89) The principle operation of the lift is based on the ascending push generated by difference in the atmospheric pressure on the top of car and under the car. The vacuum required is achieved by turbines operating as exhaust fans, located at the top of the elevator
(a) Pneumatic Lift ( ) (b) Hydraulic Lift ( )
(c) Electric Lift ( ) (d) Good lift ( )
(e) None of the above ( )

90) It is a passenger elevator which consists of chain on open compartments that move slowly in a loop up and down inside a building without stopping. Passenger can step on or off at any floor they like.
(a) Paternoster Lift ( ) (b) Hydraulic Lift ( )
(c) Electric Lift ( ) (d) Good lift ( )
(e) None of the above ( )

Section- B (10 marks)

II. Complete the following Estimation & Costing for a complete Electrical Estimate. Given

(a) 10 Nos of Very Short point @ Rs 300/-

(b) 15 Nos of Medium point @ 450/-

(c) 5 Nos of Ceiling fan point @ 450/-

(d) 50 mtr length of Main to sub-main single phase 6 Sqmm @ 500 per metre

(e) 30 mtr length of Main to Sub-main in three phases in 10 sqmm @ 700 per metre

(f) 20 EOL point of Power plug point 16 A @ 1350 per point

(g) 10 Nos of EOL AC/Geyser point 20A @ 2300 per point

(h) 25 nos of LED Tube light @ 700/-

(i) 5 Nos of Ceiling fan @ 3500/-

(j) 20 Nos Light plugs with switch board @ 4500/-

(k) 4 Nos of TP & N MCB DB with MCB 4 ways @ 12400/-

(l) 8 Nos of SP&N MCB DB with MCB 8 ways @ 3450/-

(m) 1 No L.T Panel Board in complete @ 167000/-

(n) 1 No Service Connection @ 55000/-

(o) 1 No ESE Lightning arrestor in complete @ 75000/-

(p) 2 Nos Chemical Earthing in complete @ 6700/-