MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR JUNIOR GRADE OF M.E.S. (AE/SDO) UNDER PUBLIC WORKS DEPARTMENT, GOVERNMENT OF MIZORAM, JULY, 2022.

MECHANICAL ENGINEERING PAPER – II

Time Allowed : 3 hours FM : 100 PM : 40

Marks for each question is indicated against it.
Attempt all questions.

1. True or False: **(10×1=10)**

(a) Projection welding is a multi-spot welding process.
(b) Forged welding is best suited for steel.
(c) The purpose of using flux in soldering is to prevent oxides forming.
(d) Solder is an alloy of tin and lead.
(e) The method of joining metals by means of fillers whose melting point is below 425°C is known as soldering.
(f) The commonly used flux for brazing is inert gas.
(g) The least count of Vernier Calliper is 0.005 mm.
(h) Bore gauge is used to check the diameter of a hole.
(i) Feller gauges are mostly used in engineering to measure the clearance between the two parts.
(j) Center Punch is a marking tool.

2. Compare DC arc welding and AC arc welding. **(10)**

3. Explain the following terms: **(10)**

(a) Tolerance (b) Limits
(c) Fits

4. What is electrical earthing? Explain neutral earthing and equipment earthing. Draw the earthing diagram. **(1+2+2+5=10)**

5. Draw a neat diagram of wiring system where 2(two) switches are controlling one lamp. **(5)**

6. Fill in the blank with appropriate words/terms: **(10×1=10)**

(a) 3-jaws chuck in the lathe machine is known as _____ chuck.
(b) The horizontal feed in a lathe is controlled by _____ .
(c) The cutting tool in a milling machine is mounted on _____ .
(d) The cutting edges of a twist drill are called _____ .
(e) At home electrical appliances are connected in _____ with the source.
(f) As per I.E. rules, the maximum allowable variation between declared and actual voltage at consumer's premises should be +/- _____ %.
(g) As per S.O.R (Electrical) 2016, the minimum size of wire for power wiring should be _____ .
(h) Refrigeration is based on Clausius Statement of _____ .
(i) One ton of Refrigeration is equal to _____ KJ/min.
(j) A device which maintains a body at a temperature lower than the temperature of the surroundings is called _____ .

7. A light source having luminous intensity of 300 candelas falls on a plane surface of 15m below. Find the values of illuminance at a points on the plane surface where the light rays are inclined at an angle of 30 degree and 45 degree to the surface. **(10)**

8. Choose the correct answers: **(10×1=10)**

(a) Standard wire gauge used for earthing lead should not be thinner than

(i) 8 SWG Wire (ii) 10SWG Wire
(iii) 5SWG Wire (iv) 8.5SWG Wire

(b) Air Handling Unit (AHU) is used with

(i) Packaged Plant (ii) Central AC Plant
(iii) Split AC (iv) All of the above

(c) The use of fans and blowers in central AC Plant is for

(i) Heating (ii) Cooling
(iii) Circulation of Air (iv) Both (i) & (ii)

(d) Dry ice is a solid

(i) Nitrogen (ii) Hydrogen
(iii) Carbon dioxide (iv) Carbon mono-oxide

(e) The tong tester is used for measuring

(i) RPM (ii) Volts
(iii) Frequency (iv) Amperes

(f) Which of the following provides Alternating Current Supply

(i) Dynamo (ii) Transformer
(iii) Alternator (iv) Motor

(g) Where V=Voltage, I=Current, R=Resistance and P=Power, then Ohm's Law equation is

(i) V=IR (ii) I=VR
(iii) R=VI (iv) P=VIR

(h) The most common method of cooling of power transformer is

(i) Air blast cooling (ii) Natural air cooling
(iii) Oil cooling (iv) Both (i) & (ii)

(i) Light energy radiated per second from a luminous body is known as

(i) Luminous flux (ii) Watt
(iii) Candela (iv) Lumen

(j) The ratio of the total number of lumens reaching the working plane to the total number of lumens emitting from the source is known as

(i) Waste light factor (ii) Absorption factor
(iii) Coefficient of utilization (iv) Coefficient of illumination

9. Explain the procedure to be followed for calculation of Depreciation Cost etc.for condemnation of old and unserviceable machineries and equipment, based on the guidelines issued by the P.W.D. Mizoram. **(10)**

10. Calculate the resistance of an element of 2000 watts, 220 volts electrical kettle. **(5)**

11. Explain the two conduit wiring systems. State their respective advantages and disadvantages. **(5)**

12. Explain the terms: **(5)**

(a) Refrigerants (b) Power factor

* * * * * * *