PUBLIC WORKS DEPARTMENT

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

ENGINEERING PAPER

(100 MARKS)

Signature of Invigilator _____

CODE NO.
(For Official use)

MARKS TABULATION			
Q. No.	**Marks carried by each question**	**No. of correct answers for Section - A**	**Marks**
Section - A I. 1-50	**1**		
Section - B			
II. 1	**20**		
II. 2	**15**		
II. 3	**10**		
II. 4	**5**		

Signature of Examiner_____

Signature of Scrutiniser _____

PUBLIC WORKS DEPARTMENT

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

ENGINEERING PAPER

(100 MARKS)

Roll No. _____

Signature of Candidate _____

Signature of Invigilator _____

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PUBLIC WORKS DEPARTMENT
DEPARTMENTAL EXAMINATION FOR OVERSEER (MECHANICAL ENGINEER)
ENGINEERING PAPER

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

Section-A (50 MARKS)

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

1. The following is an S.I Engine:
a) Diesel engine ( ) b) Petrol Engine ( )
c) Gas engine ( ) d) None of the above ( )

2. The following is C.I engine:
a) Diesel engine ( ) b) Petrol Engine ( )
c) Gas engine ( ) d) None of the above ( )

3. In a four stroke cycle engine, the four operations namely suction, compression, expansion and exhaust are completed in the number of revolutions of crankshaft equal to
a) Four ( ) b) Three ( )
c) Two ( ) d) One ( )

4. In a two stroke cycle engine, the operations namely suction, compression, expansion and exhaust are completed in the number of revolutions of crankshaft equal to
a) Four ( ) b) Three ( )
c) Two ( ) d) One ( )

5. The thermal efficiency of petrol engine as compared to diesel engine is
a) Lower ( ) b) Higher ( )
c) Same for same power output ( ) d) Same for same speed ( )

6. Compression ratio of petrol engine is in the range of
a) 2 to 3 ( ) b) 7 to 10 ( )
c) 16 to 20 ( ) d) None of the above ( )

7. Compression ratio of diesel engine may have a range of
a) 8 to 10 ( ) b) 10 to 15 ( )
c) 16 to 20 ( ) d) None of the above ( )

8. Carburettor is used for
a) S.I engine ( ) b) Gas engine ( )
c) C.I engine ( ) d) None of the above ( )

9. Fuel Injector is used for

a) S.I engine ( ) b) Gas engine ( )

c) C.I engine ( ) d) None of the above ( )

10. In S.I engine, to develop high voltage for spark plug

a) Battery is installed ( ) b) Distributor is installed ( )

c) Carburretor is installed ( ) d) Ignition coil is installed ( )

11. In S.I engine, to obtain required firing order

a) Battery is installed ( ) b) Distributor is installed ( )

c) Carburretor is installed ( ) d) Ignition coil is installed ( )

12. Voltage developed to strike spark in the spark plug is in the range of

a) 6 to 12 volts ( ) b) 1000 to 2000 volts ( )

c) 20000 to 25000 volts ( ) d) None of the above ( )

13. The ignition quality of fuels for S.I engine is determined by

a) Cetane number rating ( ) b) Octane number rating ( )

c) Calorific value rating ( ) d) Volatility of the fuel ( )

14. The ratio of Brake power to Indicated Power of I.C engine is called

a) Mechanical efficiency ( ) b) Thermal efficiency ( )

b) Volumetric efficiency ( ) b) Relative efficiency ( )

15. In a four stroke cycle petrol engine, during suction stroke

a) Only air is sucked in ( ) b) Only petrol is sucked in ( )

c) Mixture of petrol and air is sucked in ( ) d) None of the above ( )

16. In a four stroke cycle diesel engine, during suction stroke

a) Only air is sucked in ( ) b) Only petrol is sucked in ( )

c) Mixture of petrol and air is sucked in ( ) d) None of the above ( )

17. The two stroke cycle engine has

a) One suction valve and one exhaust valve operated by one cam ( )

b) One suction valve and one exhaust valve operated by two cams ( )

c) Only ports covered and uncovered by piston to effect charging and exhausting ( )

d) None of the above ( )

18. The specific fuel consumption of a diesel engine as compared to that of petrol engine is

a) Lower ( ) b) Higher ( )

c) Same for same output ( ) d) None of the above ( )

19. In case of petrol engine, at starting

a) Rich fuel-air ratio is needed ( ) b) Weak fuel-air ratio is needed ( )

c) Chemically correct fuel-air ratio is needed( ) d) Any fuel-air ratio will do ( )

20. In case of S.I engine to have best thermal efficiency, the fuel-air mixture ratio should be

a) Lean ( ) b) Rich ( )

c) May be lean or rich ( ) d) Chemically correct ( )

21. The torque developed by the engine is maximum

a) At minimum speed of the engine ( )

b) At maximum speed of the engine ( )

c) At maximum volumetric efficiency speed of the engine ( )

d) At maximum power speed of the engine ( )

22. The purpose of supercharging of engine is

a) To raise the volumetric efficiency above that value which can be obtained by normal aspiration ( )

(b) To raise the volumetric efficiency below that value which can be obtained by normal aspiration ( )

c) To reduce the volumetric efficiency ( )

d) None of the above ( )

23. Method of air cooled engine among the following is

a) Fins type cooling ( )

b) Thermo-syphon cooling ( )

c) Forced or pump cooling ( )

d) None of the above ( )

24. Compression ratio of an engine is the ratio of

a) Total cylinder volume to clearance volume ( )

b) Clearance volume to total cylinder volume ( )

c) Swept volume to clearance volume ( )

d) None of the above ( )

25. Example of external combustion engine is

a) Petrol engine ( ) b) Diesel engine ( )

c) Steam engine ( ) d) None of the above ( )

26. Which one of the following is not a fusion welding process

a) Gas welding ( ) b) Arc welding ( )

c) Brazing ( ) d) Resistance welding ( )

27. Which one of the following is a fusion welding process

a) Gas welding ( ) b) Brazing ( )

c) Soldering ( ) d) None of the above ( )

28. The main criterion for selection of electrode diameter in arc welding is

a) Material to be welded ( ) b) Thickness of material ( )

c) Voltage used ( ) d) Current used ( )

29.Which of the following is preferred for welding of non-ferrous metals by arc welding?

a) A.C low frequency ( ) b) A.C high frequency( )

b) D.C ( ) d) All the above ( )

30. In welding, material used for coating the electrode is called

a) Binder ( ) b) Slag ( )

c) Deoxidizer ( ) d) Flux ( )

31. Following gases are used in Tungsten inert gas welding

a) CO_2 and H_2 ( ) b) Argon and neon ( )

c) Helium and neon ( ) d) Argon and helium ( )

32. Two sheets of same material but different thickness can be butt welded by

a) Adjustment of the current ( ) b) Time duration of the current ( )

c) Pressure applied ( ) d) Changing the size of one electrode ( )

33. Brazing is a process of joining of metals with non-ferrous filler metal

a) At a temperature above 427°C and also below the melting point of metals being joined. ( )

b) At a temperature below 427°C and also below the melting point of metals being joined. ( )

c) At a temperature below 427°C and above the melting point of metals being joined. ( )

b) At a temperature above 427°C and above the melting point of metals being joined ( )

34. Soldering is a process of joining of metals with non-ferrous filler metal

a) At a temperature below 427°C and also below the melting point of metals being joined. ( )

b) At a temperature above 427°C and also below the melting point of metals being joined. ( )

c) At a temperature below 427°C and above the melting point of metals being joined. ( )

b) At a temperature above 427°C and below the melting point of metals being joined ( )

35. In braze welding, the filler metal is

a) Distributed by capillary action ( )

b) Melted and deposited at the point where the welding is to be made,
at the melting point of the filler material. ( )

c) Both of the above ( )

d) Not required. ( )

36. A ring gauge is used to measure

a) Outside diameter but not roundness ( )

b) Roundness but not outside diameter ( )

c) Both outside diameter and roundness ( )

d) Only external threads ( )

37. External taper can be accurately measured with the help of

a) Sine bar and slip gauges ( ) b) Dividing head ( )

c) Precision balls and height gauge ( ) d) Combination set ( )

38. Tolerances are specified

a) To obtain desired fits ( ) b) Because it is not possible to manufacture a size exactly ( )

c) To obtain higher accuracy ( ) d) To have proper allowances ( )

39. The basic unit in angular measurement is

a) Degree ( ) b) Minute ( )

c) Second ( ) d) Right angle ( )

40. Accuracy is

a) Repeatability of measuring process ( )

b) Error of judgement in recording an observation ( )

c) Ability of instrument to reproduce same reading under identical situations ( )

d) Agreement of the result of a measurement with the true value of the measure quantity ( )

41. Precision is

a) Repeatability of measuring process ( )

b) Agreement of the result of a measurement with the true value of the measure quantity ( )

c) Ability of instrument to reproduce same reading under identical situations ( )

d) All of these ( )

42. Bevel protractor is used for

a) Angular measurement ( )

b) Linear measurement ( )

c) Height measurement ( )

d) Flatness measurement ( )

43. Planer Gauge is used for

a) Testing flatness of surface ( )

b) Adding to utility of measurements on surface plate ( )

c) Angular measurement ( )

d) All of these ( )

44. Clinometer is related with

a) Engineer's parallels ( )

b) Angle gauge ( )

c) Spirit level ( )

d) Bevel protractor ( )

45. Most accurate instrument is

a) Vernier calliper ( ) b) Manometric screw gauge ( )

c) Optical projections ( ) d) Slip gauge ( )

46. Machine Lathe bed is usually made of

a) Structural steel ( ) b) Stainless steel ( )

c) Cast iron ( ) d) Non-ferrous materials ( )

47. Tool life is said to be over if

a) A poor surface finish is obtained ( )

b) Sudden increase in power and cutting force with chattering take place ( )

c) Overheating and fuming due to friction start ( )

d) All of the above ( )

48. Tool life is mostly affected by

a) Cutting speed ( ) b) Tool geometry ( )

c) Feed and depth ( ) d) Not using coolant and lubricant ( )

49. Ceramic tools are made from

a) Tungsten oxide ( ) b) Silicon carbide ( )

c) Cobalt ( ) d) Aluminium oxide ( )

50. Counter boring is the operation of

a) Enlarging the end of a hole cylindrically ( )

b) Cone-shaped enlargement of the end of a hole ( )

c) Smoothing and squaring the surface around a hole ( )

d) Sizing and finishing a hole ( )

Section – B (50 Marks)

II. Attempt all the questions:

1) Explain the uses and functions of the following machines: (10X2 = 20 marks)

a) Excavator b) Backhoe c) Bulldozer

b) Grader e) Trencher f) Loader

c) Paver h) Concrete Mixture Machine i) Total Station

j) Compactor

2) Survey Report- Preparation of survey report (Repair Estimate, Maintenance of Log Book, History Sheet). (15 marks)

3) Write down the equation for total depreciation for condemnation of machineries and equipment (as per the present practice of PWD Mizoram). Explain each component. (10 marks)

4) Match the following of Measuring Instruments and their uses: (5x1= 5 marks)

i) Sine bar	a) External diameter of thick cylindrical rod
ii) Tachometer	b) Angle measurement
iii) Screw Gauges	c) Pressure
iv) Vernier Caliper	d) External diameter of thinner wires
v) Barometer	e) Torque