MECHANICAL ENGINEERING PAPER – II

Time Allowed : 3 hours

FM : 100  PM : 40

Marks for each question is indicated against it.

Attempt all questions.

1. What do you mean by I.C. and C.I. engines?  
(2+2=4)

2. State any one difference between diesel engine and petrol engine.  
(2+2=4)

3. Give a classification of I.C. engines according to the fuel used. 
(3)

4. What are the three methods of cooling of I.C. engines?  
(3×1=3)

5. When does an engine require overhaul? Mention three indications.  
(3×1=3)

6. Describe four maintenance procedures for diesel engine.  
(4×1=4)

7. Mention four different types of pump based on the function of pumps.  
(4×1=4)

8. What do you mean by pump and pumping?  
(2+ 2=4)

9. Mention any two machines which are used to develop power for the running (working) of pumps.  
(2×1=2)

10. What are the various methods which are adopted to estimate population of each successive future decade? Mention five.  
(5×1=5)

11. Calculate size of pumping main for the following data and select commercial diameter.  
(10)

Quantity of water 1.0 MLD (Million litre per day)
Pumping hour = 16 hours per day
Velocity of flow \( V = 1.1 \) m/sec, take \( \pi = 3.14 \)

Use the formula \( d = \frac{4Q}{\pi V} \)
12. Calculate SHP (Shaft Horse Power) required of clear water and capacity of the pump driving motor for the following data.  
\[
\text{Rate of water supply} = 70 \text{ lpcd} \\
\text{Population} = 20,000 \text{ souls} \\
\text{Static head} = 420 \text{ m} \\
\text{Head losses due to friction, bend, valves etc} = 30 \text{ m} \\
\text{Combined efficiency} = 70\% \\
\text{Assuming 16 hour of pumping per day.}
\]

Use the formula: \[ \text{Shaft Horse Power} = \frac{Q \times H \times \text{Specific gravity}}{75 \times \eta} \]

Where
\[
\begin{align*}
Q & = \text{discharge in litre/sec} \\
H & = \text{Total head in metres} \\
\eta & = \text{Pump efficiency} \\
\text{Take specific gravity} & = 1
\end{align*}
\]

Add 10% for pump requiring more than 75 kw and add 2% for elevation effect.

13. What is gas welding? How is it done?  
14. What is oxygen cutting?  
15. Mention any five major components of water supply plant.  
16. What do you mean by Machine and Mechanism?  
17. Describe five different types of pipe used for water supply.  
18. Describe four commercial sizes in mm of GI pipe commonly used in PHE Department, Mizoram.  
19. Mention five different jointing materials (GI specials) for jointing of GI pipe.
20. What do you mean by Hand Pump (HPTW)? What are two types of HPTW commonly used in Mizoram by PHED?  
21. What are two broad headings of types of welding? Explain briefly.  
22. Explain briefly the usefulness of log Books for Water Treatment Plant and Pump Houses.

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