MIZORAM PUBLIC SERVICE COMMISSION

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

ENGINEERING PAPER – II

MECHANICAL ENGINEERS

Time Allowed : 3 hours FM : 100 PM : 40

Marks for each question is indicated against it.

Attempt all questions.

1. Write three Newton's laws of motion. **(3×2=6)**

2. What are friction and force of friction? **(2×2=4)**

3. What are I.C and C.I engines? Give one example each. **(4)**

4. Write any four advantages of use of lubrication in I.C engines? **(4×1=4)**

5. What are common fuels used in I.C engines? **(2)**

6. What are the long form of PERT and CPM in network analysis? **(2×1=2)**

7. What are three reasons for having preventive maintenanace? **(3×1=3)**

8. In Water Treatment Plant and Pump Houses in Mizoram, we use log Books. Mention any three usefulness of the same. **(3×1=3)**

9. What do you understand by plastic welding? Give 2(two) examples. **(2×2=4)**

10. Briefly explain gas welding. **(3)**

11. What is oxygen cutting which is extensively used nowadays in industry? **(3)**

12. What is soldering? **(2)**

13. Briefly explain - **(4×2=8)**

(a) Ductile Iron Pipe (b) Galvanised Iron

(c) Steel (d) Cast Iron

14. What is Electric Resistance Welding? **(2)**

15. What is a pump and pumping? **(2+2=4)**

16. Write any four types of Pump? **(4×1=4)**

17. What are two major factors for selection of type of a pump? **(2×1=2)**

18. What are two types of pump testing? Why Pump testing is necessary? **(2+1=3)**

19. In Mizoram, PHE Department prefers centrifugal pump for pumping schemes, write any five advantages. **(5×2=10)**

20. What are two principal types of three-phase motors? **(2×1=2)**

21. What are two main prime movers used to drive pumps in Mizoram Water Supply Project? **(2×1=2)**

22. What are three common method for population forecasts? **(3×1=3)**

23. Under JJM, the service level of water supply to village is 55 lpcd. Write the details break-up? **(4×1=4)**

24. Calculate the size of pumping main in mm and select commercial diameter for the for the following : **(6×1=6)**

Quantity of water = 37 MLD (Million litre per day)

Pumping hour = 16 hours per day

Velocity of flow in the pipe v = 1.62 m/sec, take p = 3.14

Use the formula d = $\sqrt{\frac{4Q}{\pi v}}$

25. Calculate SHP (Shaft Horse Power) requirement for clear water pump and capacity of Electric motor of the above pump for the following data :- **(10×1=10)**

Rate of water supply	= 55 Lpcd
Population (Design)	= 6,000 souls
Total Static Head	= 280 m
Total Head losses	= 18 m
Combined efficiency	= 70%
Pumping hour	= 16 hours per day

Use formula $SHP = \frac{Q \times H \times pecific\ gravit}{75 \times \eta}$

where Q = discharge in litre/sec

H = Total head in metre

h = combined efficiency

Further take specific gravity = 1

and add 10% margin for electric motor and add another 2% for elevation effect.

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