MIZORAM PUBLIC SERVICE COMMISSION

DEPARTMENTAL EXAMINATIONS FOR
AE/SDO
UNDER PUBLIC HEALTH ENGINEERING DEPARTMENT, JANUARY 2016

MECHANICAL ENGINEERING PAPER–II

Time Allowed : 3 hours   FM : 100   PM : 40

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

1. Define the following equations of Linear Motion.   **(4×1=4)**
   (a) $v = u + ft$ (b) $s = ut + ½ ft^2$
   (c) $v^2 = u^2 + 2fs$ (d) $s = (u + v)^t / 2$

2. What is Mechanism?   **(1)**

3. Fill in the blanks of the following sentences.   **(5×1=5)**
   (a) A mechanism with more than _____ links is known as compound mechanism.
   (b) A _____ is an instrument used to reproduce to an enlarged or a reduced scale and as exactly as possible the path described by a given point.
   (c) The magnitude of the force of friction is exactly _____ to the force, which tends the body to move.
   (d) The force of friction _____ with the increase of temperature of the lubricant.
   (e) _____ is defined as the ratio of the limiting friction to the normal reaction between the two bodies.

4. Define the following types of pumps.   **(3)**
   (a) Displacement pump   (b) Centrifugal pump
   (c) Vertical turbine pump

5. Fill in the blanks of the following sentences.   **(4×1=4)**
   (a) For suction of pump include the type and size of wells, fluctuation of _____ levels and location of the pump.
   (b) A careful consideration of characteristic curves (H-Q), (n-Q) and _____ is extremely necessary before arriving final selection of the pump.
   (c) The pump selected should be which gives maximum _____ at the operating point.
   (d) The _____ in speed of the pump improves the efficiency of the pump.

6. Mention careful observations to be made during the whole period of pump test.   **(4)**

7. Fill in the blanks of the following sentences.   **(12×1=12)**
   (a) _____ maintenance only after fault or breakdown.
   (b) Pump / machines should be _____ correctly to avoid vibration.
   (c) Prior to start the pump, all _____ system should be with recommended lubricants.

(d) Bearing lubrication of pump should be checked at the interval of every _____ months.

(e) Induction motor starter & rotor should be checked at the interval of every _____ months.

(f) Bearing of induction motor should be checked at the interval of every _____ months.

(g) 'B' maintenance checks of Cummins Engine should be done at _____ hours.

(h) 'D' maintenance checks of Cummins Engine should be done at _____ hours.

(i) _____ used in machine serve as energy reservoir.

(j) The function _____ is to regulate the mean speed of an engine when there is variation on the load.

(k) Black smoke emitting from the exhaust is due to _____ ratio imbalance.

(l) When blue smoke is emitted from the exhaust it indicates that the engine is burning _____.

8. Compare IC and CI Engine. **(2)**

9. Complete the following sentences. **(4×1=4)**

(a) In Spark ignition four stroke cylinder engine the cam shafts runs at half speed of the _____.

(b) In a four stroke cylinder diesel engine, during suction stroke, only air _____.

(c) The specific fuel consumption of diesel engine as compared to petrol engines is _____.

(d) Standard firing order for four cylinder petrol engine is _____.

10. Define the following. **(3×1=3)**

(a) Calorific value of fuel.

(b) Higher calorific value of fuel.

(c) Lower calorific value of fuel.

11. What are the important functions of lubricating oil? **(3)**

12. What are the reasons of high oil consumption? **(3)**

13. What are the important points to consider while deciding overall requirements of pumping stations? **(4)**

14. Water has to supplied to a town with one lakh population at the rate of 135 litres/capita/day from a river 2000m away. The difference in elevation between the lowest water level in the sump and main reservoir is 100m. If the demand has to be supplied in 8 hours. Determine if f = 0.0075, velocity of water in the pipe is 2.0 m/sec and efficiency of pump 80 %. **(2+2+2=6)**

(a) Water demand of the town per day.

(b) Diameter of the pumping mains

(c) BHP of pump required.

15. Fill in the blanks of the following sentences. **(5×1=5)**

(a) The pump house should have a telephone, a wall clock and _____inside the building.

(b) The inflow in the suction pump should be at the furthest end from the suction pipe to avoid effect of _____.

(c) During drying of motor insulation winding temperature should be maintained at about _____.

(d) The advantage of providing power capacitor is improvement of _____.

(e) It is undesirable to run the pump at capacities _____ than design capacity.

16. What are the differences between PERT and CPM for planning and controlling of a Project? **(5)**

17. Write about Health and Welfare of Water Works maintenance personnels. **(3)**

18. Explain the process of the following   **(3×3=9)**

    (a) Oxyacetylene Gas Welding

    (b) Metal Arc Welding

    (c) Resistance Welding

19. Write a short note on the following and their applications.   **(3×3=9)**

    (a) Lathe machine

    (b) Boring machine

    (c) Drilling machine

20. Define rotary air compressor and its application in water works.   **(3)**

21. Write the properties of the following   **(3×2=6)**

    (a) Steel

    (b) Cast Iron

    (c) Ductile Iron

22. Write compositions of stainless steel and its uses.   **(2)**

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