ONE TIME EXIT SCHEME

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10MR55

Fifth Semester B.E. Degree Examination, April 2018

Marine Machinery and System Design

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Use of data hand book, if necessary.***

PART – A

1 a. Write the design considerations during casting. **(10 Marks)**

b. Explain briefly the injection moulding in plastic moulding process. **(10 Marks)**

2 a. A line shaft is driven by means of a motor placed vertically below it. The pulley on the shaft is 1.5 m in diameter and has belt tension 5.4 kN and 1.8 kN on the tight side and slack side respectively. Both these tension may be assumed to be vertical. If the pulley be overhang from the shaft the distance of the center, line of the pulley from the centre line of the bearing 400 mm. Find the diameter of the shaft assuming max allowable shear stress 42 MPa. **(10 Marks)**

b. An Otto cycle engine develops 50 KW at 150 rpm with 75 explosions per minute. The change of speed from the commencement to the end of the power stroke must not exceed 0.5% of mean on either side. Design a suitable rim section having width four times the depth. So that the loop stress does not exceed 4 MPa. Assume that the flywheel stores 16/15 times the energy stored by the rim, and that the work done during the power stroke is 1.40 times the work done during the cycle. Density of rim material is 7200 kg/m^3. **(10 Marks)**

3 a. Design a cast iron piston for a single acting four stroke engine for the following data:
Cylinder bore = 100 mm
Stroke = 125 mm
Max gas pressure = 5 N/mm^2
Indicated mean effective pressure = 0.75 N/mm^2
Mechanical efficiency = 80%
Fuel consumption = 0.15 kg/B.P/hour
Higher calorific value of fuel = 42×10^3 kJ/kg
Speed = 2000 rpm.
Any other data required for the design may be assumed. **(14 Marks)**

b. Define spring index, stiffness of the spring, solid length. **(06 Marks)**

4 a. Design a helical compression spring for a maximum load of 1000 N for a deflection of 25 mm using the value of spring index as 5. The max permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm^2. Take Wahl's factor,

$$K = \frac{4c-1}{4c-4} + \frac{0.615}{c}$$ where c = spring index. **(08 Marks)**

b. With neat sketch, explain globe valve. **(06 Marks)**

c. Explain thrust bearing with neat sketch. **(06 Marks)**

PART – B

5 a. With a neat sketch explain heat exchanges used in diesel engine. **(10 Marks)**

b. Explain centrifugal pump with neat sketch. **(10 Marks)**

6 a. Write down any 10 properties of lube oil and explain. **(10 Marks)**

b. Explain with neat line diagram, lubricating oil system of marine engine. **(10 Marks)**

7 a. Explain with neat sketch, two stage reciprocating air compressor (compound type). **(10 Marks)**

b. With neat sketch, explain starting air system of two stroke diesel engine. **(10 Marks)**

8 a. Explain types of scavenging system, with neat sketch. **(10 Marks)**

b. Write a short note on helix control fuel pump in marine diesel engine. **(10 Marks)**

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