Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Marine Machinery and System Design

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. What are the design considerations for plastic moulding. **(06 Marks)**
   b. Write the design consideration for surface finish. **(04 Marks)**
   c. Explain the classification of manufacturing process. **(10 Marks)**

2 a. A multi-cylinder engine is to run at a constant load and at a speed of 600rpm on drawing the crank effort diagram to a scale of 1mm = 250N-m and 1mm = 3°, the areas in mm² above and below the mean torque line are as follows +160, −172, +168, −191, +197, −162 mm², The speed is to be kept within 1% of the moment of the flywheel, with a rim whose breadth is twice its radial thickness. The density of cast iron is 7250 Kg/m³ and working stress in tension is 6MPa. Assume that the rim contributed 92% of the flywheel effect. **(10 Marks)**
   b. A line shaft is driven by means of a motor placed vertically below it. The pulley on the shaft is 1.5m in diameter and has belt tension 5.4kN and 1.8kW on tight side and slack side of the belt respectively. Both these tension may be assumed to be vertical. If the pulley be overhang from the shaft, the distance of the centre line of the pulley from the centre line of the bearing 400mm. Find the diameter of the shaft assuming max allowable shear stress of 42 MPa. **(10 Marks)**

3 a. Design an I-section of a connecting rod for an I.C engine running at 1800 rpm and developing a max pressure of 3.15 N/mm². The diameter of the piston is 100mm mass of the reciprocating parts per cylinder 2.25kg, length of connecting rod 380mm and stroke of piston 190mm and compression ratio 6:1. Take a factor of safety of 6 for the design. Take length to diameter ratio for big and bearing as 1:3 and small end bearing as 2 and the corresponding bearing pressure as 10N/mm² and 15N/mm². The density of material of the rod may be taken as 8000kg/m³ and the allowable stress in the bolt as 60N/mm³ and in cap as 80N/mm². The rod is to be of I-section for which you can choose your own proportions. **(15 Marks)**
   b. Define, indicated power, Brake Power and Frictional Power. **(05 Marks)**

4 a. List down the types of valves and explain globe valve. **(10 Marks)**
   b. A helical torsion spring of mean diameters 60mm is made of a round wire of 6mm diameter. If a torque of 6 N-m is applied on the spring find the bending stress induced and the angular deflection of the spring in degrees. The spring index is 10, and modulus of elasticity for the spring material is 2000 kN/mm². The number of effective turns may be taken as 5.5 **(10 Marks)**

PART – B

5 a. Explain gear pump with neat sketch. **(10 Marks)**
  b. Write a short note on intermediate shaft and Tail-end Shaft. **(10 Marks)**

6 a. Explain with neat line diagram, lubricating oil system of marine engine. **(10 Marks)**
  b. Write down any 15 properties of lube oil and explain. **(10 Marks)**

7 a. Sketch and explain two stage reciprocating air compressor (compound type). **(10 Marks)**
  b. Explain with neat sketch, suction and spill controlled fuel pump. **(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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