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10MR55

Fifth Semester B.E. Degree Examination, June/July 2017
Marine Machinery and System Design

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What are the design considerations for plastic moulding? **(06 Marks)**

b. Write the design considerations for surface finish. **(04 Marks)**

c. Briefly explain the design consideration for casting process. **(10 Marks)**

2 a. A shaft is supported on bearing A and B 800mm between centers. A 20° straight tooth spur gear having 600mm pitch diameter is located 200mm to the right of the left hand bearing A and a 700mm diameter pulley is mounted 250mm towards the left of bearing B. The gear is driven by a pinion with a downword tangential force while the pulley drives a horizontal belt having 180° angle of wrap. The pulley also serves as a flywheel and weight 2000N. The maximum belt tension is 3000N and the tension ratio is 3:1. Determine shaft diameter, if the allowable shear stress of the material is 40MPa. **(12 Marks)**

b. A shaft made of mild steel is required to transmit 100kW at 300rpm. The supported length of the shaft is 3 metres. It carries two pulley's each having a weight of 1500N supported at a distance of 1 metre from the ends respectively. Assuming the safe value of stress, determine the diameter of the shaft. **(08 Marks)**

3 a. Design a connecting rod for an I.C Engine running at 1800 rpm and developing a maximum pressure of 3.15 N/mm+2. The diameter of the piston is 100mm ; mass of the reciprocating parts per cylinder 2.25 kg ; length of connecting rod 380mm ; 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 end bearing as 1.3 and small end bearing as 2 and the corresponding bearing pressure 10N/mm+2+ and 15N/mm^2. The density of material of the rod may be taken as 8000 kg/m^3 and the allowable stress in the bolts as 60N/mm^2 and in cap as 80N/mm^2. The rod is to be of I – section for which you can choose your own proportions. Use Rankine's formula for which the numerator constant may be taken as 320 N/mm^2 and the denominators constant 1/7500. **(16 Marks)**

b. Write a short note an Eccentric loading of springs. **(04 Marks)**

4 a. Design a cast iron flywheel used for four stroke I.C engine developing 180kW at 240rpm. The loop or centrifugal stress developed in the flywheel is 5.2 MPa, the total fluctuation of speed is to be limited to 3% of the mean speed. The work done during the power stroke is 1/3 more than average work done during the whole cycle. The max torque. The density of cast iron is 7200kg/m^3. **(12 Marks)**

b. List down the types of valves and explain globe valve. **(08 Marks)**

PART – B

5 a. Explain the neat sketch, the pump used in water cooling system. **(10 Marks)**

b. Write a short note on : i) Thrust block ii) Intermediate shaft. **(10 Marks)**

6 a. Write down any 15 properties of lube oil and explain. **(10 Marks)**
b. Explain with neat sketch electrohydraulic 4-ram steering gear system. **(10 Marks)**

7 a. Sketch and explain two stage reciprocating air compressor (compound type). **(10 Marks)**
b. With a neat sketch explain construction and working of a needle valve type fuel injector. **(10 Marks)**

8 a. With a neat sketch explain scavenging and exhaust system of two stroke marine diesel engine. **(10 Marks)**
b. Explain with neat sketch starting air receiver. **(05 Marks)**
c. Explain start air Pilot valve with neat sketch. **(05 Marks)**

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