

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 171803**Date: 24/11/2011****Subject Name: Marine Machinery System Design****Time: 10.30 am-01.00 pm****Total marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Enlist different production methods. Explain any one in brief. **07**
 (b) Write short note on machining tolerances and surface finishes. **07**

- Q.2** (a) Discuss various types of stresses induced in a flywheel rim. **07**
 (b) A hollow shaft of 0.5 m outside diameter and 0.3 m inside diameter is used to drive a propeller of marine vessel. The shaft is mounted on bearings 6 meter apart and it transmits 5600 kW at 150 r.p.m. The maximum axial propeller thrust is 500 kN and the shaft weight 70 kN. Determine The maximum shear stress developed in the shaft. **07**
 Where $K_m = 1.5$ and $K_t = 1.0$

OR

- (b) Design a helical compression spring for a maximum load of 1000 N **07**
 for a deflection of 25 mm using the value of spring index as 5. The maximum permissible shear stress for spring wire is 420 MPa and modulus of rigidity is 84 kN/mm². Take wahl's factor

$$K = \frac{4C - 1}{4C - 4} + \frac{0.615}{C}$$
, Where C= Spring Index

Table: Standard wire Gauge (SWG) number and corresponding
diameter of spring wire.

SWG	Dia(mm)	SWG	Dia(mm)	SWG	Dia(mm)
4/0	10.160	0	8.229	3	6.401
3/0	9.490	1	7.620	4	5.893
2/0	8.839	2	7.010	5	4.877

- Q.3** (a) What are the various terms used in journal bearing analysis and design? Give their definition in brief. **07**
 (b) The thrust of propeller shaft in a marine engine is taken up by a number of collars integral with the shaft which is 300mm is diameter. The thrust on the shaft is 200 kN and the speed is 75 r.p.m. Taking μ constant and equal to 0.05 and assuming the bearing pressure as uniform and equal to 0.3 N/mm², find: (1) Number of collars required, (2) Power lost in friction, and (3) Heat generated at the bearing in kJ/min. Take outer diameter of collar is 1.4 times the shaft diameter. **07**

OR

- Q.3** (a) Explain working of Central water cooling system with neat sketch. **07**
 (b) Explain working of Conventional water cooling system with neat sketch. **07**

- Q.4 (a)** Explain with neat sketch marine lubricating oil systems. **07**
(b) Explain with neat sketch marine Electro-hydraulic steering gear system. **07**

OR

- Q.4 (a)** Explain Marine Diesel Engine Air starting systems. **07**
(b) Explain Marine Diesel Scavenge and Exhaust System. **07**

- Q.5 (a)** Explain with neat sketch marine power transmission system. **07**
(b) Explain with neat sketch marine diesel engine fuel injection system. **07**

OR

- Q.5 (a)** Write a short note on FEA **07**
(b) Explain Finite Element Analysis of Thermal Stress with example **07**
