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***B. Tech. Degree IV Semester Supplementary Examination in
Marine Engineering June 2015***

MRE 401 MECHANICS OF MACHINERY

Time: 3 Hours

Maximum Marks: 100

(5 × 20 = 100)

- I. (a) Explain kinematic chains and their classification.
(b) A linkage has 11 links and 4 loops. Calculate its degree of freedom and number of ternary and quaternary links it will have if it has only single turning pairs.

OR

- II. (a) What is Corioli's component?
(b) In a slider-crank mechanism, the crank is 480 mm long and rotates at 20 rad/s in the counter clockwise direction. The length of the connecting rod is 1600 mm. When the crank turns 60° from the inner-dead centre, determine (i) the velocity of the slider (ii) the velocity of the point E located at a distance of 450 mm on the connecting rod extended and (iii) the angular velocity of the connecting rod.

- III. (a) Explain pantograph.
(b) Describe classification of cams and followers, with the help of neat sketches.

OR

- IV. (a) Define displacement, velocity, acceleration and jerk.
(b) Draw the profile of a cam operating a roller reciprocating follower and with the following data:

Minimum radius of cam	=	25 mm
Lift	=	30 mm
Roller diameter	=	15 mm

The cam lifts the follower for 120° with SHM followed by a dwell period of 30°. Then the follower lowers down during 150° of the cam rotation with uniform acceleration and deceleration followed by a dwell period. If the cam rotates at a uniform speed of 150 rpm, calculate the maximum velocity and acceleration of the follower during the decent period.

- V. (a) Explain functions of a governor?
(b) Describe any two types of governor.

OR

- VI. Write notes on (i) Sensitivity of governor (ii) Hunting of governor
(iii) Consideration of friction in governor.

- VII. (a) Compare characteristics of involute and cycloidal gear teeth profiles.
(b) Explain spur gear terminology with the help of a neat sketch.

OR

- VIII. An epicyclic gear consists of a pinion, a wheel of 40 teeth and an annulus with 84 internal teeth concentric with the wheel. The pinion gears with the wheel and the annulus. The arm that carries the axis of the pinion rotates at 100 rpm. If the annulus is fixed, find the speed of the wheel; if the wheel is fixed, find the speed of the annulus.

- IX. Briefly explain the power transmission through belt drives. Also derive the expression for ratio of belt tension.

OR

- X. Write notes on:
(i) Multi plate clutches
(ii) Internal expanding shoe brakes
(iii) dynamometers
