B.TECH. SEM -V PRODUCTION 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT : KINEMATICS & DESIGN OF MANUFACTURING MACHINES

Day : **Tuesday** Time : **10.00 AM TO 01.00 PM**
Date : **22/05/2018** **S-2018-2371** Max. Marks : 60

N.B.:
1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non programmable **CALCULATOR** is allowed.
4) Assume suitable data if necessary.

Q.1 **a)** Classify the different types of motion drives and state merits and demerits of gear drive. **[05]**

b) Explain coupler curved point. **[05]**

OR

Q.1 Show that $\cos(\theta_2 - \theta_4) > k_1 \cos\theta_4 - k_2 \cos\theta_2 + k_3$ as a Freudensteins equation for four bar mechanism. **[10]**

Q.2 Derive Lewis equation for beam strength of a gear tooth with neat sketch. **[10]**

OR

Q.2 The following data is given for transmitting 15 kw power from an electric motor running at 720 rpm to 9 gear running at 360 rpm. **[10]**

Number of teeth on pinion	= 18
Centre distance	= 180 mm
Approximate helix angle	$= 26^0$
Face width	= 12 x normal module
Tooth system	= 20^0 full depth involute
Permissible bending stress for pinion and gear material	= 150 N/mm^2
Service factor	= 1.25
Combined teeth error	= 40 microns
Deformation factor	= 11600 e N/mm
Surface hardness	=350 N/mm^2

Assuming the dynamic load is accounted by the Buckingham's equation determine:

i) The factor of safety against bending failure and
ii) The factor of safety against pitting failure.

Q.3 What are the principles of Design for manufacturing? Explain the principles for casting, forging and welding process. **[10]**

OR

Q.3 Describe the importance of Aesthetic and Ergonomic considerations in design. **[10]**

P.T.O.

Q.4 Describe design of guides under Hydrostatic lubrication with neat sketch. **[10]**

OR

Q.4 **a)** A vertical shaft of 150 mm diameter rotating at 1000 rpm rests on a flat end footstep bearing. The shaft carries a vertical load of 20kN. Assuming uniform pressure distribution and coefficient of friction equal to 0.05. Estimate power lost in friction. **[05]**

b) Explain friction of pivot bearing considering the case of uniform pressure. **[05]**

Q.5 Describe free vibrations with viscous damping and derive an equation for displacement (x), velocity $\left(\dot{x}\right)$, critical damping coefficient (C_c) and damping factor. **[10]**

OR

Q.5 A horizontal spring mass system with coloumb damping has a mass of 5 kg attached to spring of stiffness 980 N/m. if the coefficient of friction is 0.025 calculate: **[10]**

a) Frequency of free oscillations.

b) The number of cycles corresponding to 50% reduction in the amplitude if the initial amplitude is 50 mm and

c) The time taken to achieve this reduction.

Q.6 Describe the decision of rejection and acceptance by using the relation between design and natural tolerances. **[10]**

OR

Q.6 Explain optimum design for minimizing weight. **[10]**

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