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EPI601

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 141603

Roll No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
PRINCIPLES OF MACHINE TOOL DESIGN

Time : **3** Hours]   [Total Marks : **100**

Note : (i)   Attempt **ALL** questions.

(ii)   All questions carry **equal** marks.

1   Attempt any four parts of the following :   **4×5=20**

a)   Explain Tool Wear? Describe Crater Wear and Flank Wear.

b)   Explain the working of any tool dynamometer giving its important characteristics.

c)   Write a detailed note on the history and development of machine tools.

d)   'Lathe is the Queen of all machine tools'–justify the statement giving suitable reasons.

e)   Discuss the general performance criteria of machine-tools.

f)   What is a single spindle automat generally used for? What is a transfer machine?

141603]   **1**   **[Contd...**

2　　Answer any four parts of the following:　　　　**4×5=20**

a)　Discuss the factors to be considered in the selection of machine tool drive.

b)　Give a list of mechanisms used for conversion of rotation to translation and vice-versa. Sketch at least two of them.

c)　Explain various types of quick return mechanisms, their applications and advantages.

d)　Describe the working of a four-way, two position, piston type direction control valve. Sketch the valve.

e)　Explain the working principle and important applications of Geneva mechanism.

f)　Describe the working principle of Oldham coupling with the help of a neat sketch.

3　　Attempt any two parts of the following :　　　　**2×10=20**

a)　Design the kinematic arrangement of the head stock of a lathe with the following specifications :

Maximum speed = 1500 R.P.M

Minimum speed = 50 R.P.M

No of steps required 18. Use (2 × 3 × 3) arrangement.

Draw a ray diagram for the headstock. Now calculate the number of teeth on gears used in the first stage of speed transmission; and show the head stock gear layout for all the stages of transmission schematically.

b)　What is meant by "Preferred numbers" and what is the advantage of adopting them? Describe "Androin progression ratio" and explain how the basic series of preferred numbers is derived from it?

c)　Describe one mechanical friction stepless drive and one electrical stepless drive with suitable sketches.

4   Attempt any two parts of the following :   **2×10=20**

a)   What are the main requirements of a machine tool structure? Show that using steel in reference to cast iron for machine tool structure would result into weight savings of about 50-70%.

b)   What materials are commonly used for the machine tool spindles? What main characteristics a spindle should possess?

c)   For a lathe guide-way consisting of vee and flat combination, show that the slide moving over the guide may overturn when very large or very small work diameters are machined. Give all assumptions made in support of your answer.

5   Attempt any two parts of the following :   **2×10=20**

a)   What do you understand by 'Chatter' in machine tools? How it affects the product quality? How it can be removed? Explain.

b)   What do you understand by Numerical Control of Machine Tools? Explain. Compare its advantages over conventional machining processes.

c)   Explain in detail various steps involved in testing of Machine Tools.

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