B.E. (Mechanical Engineering) Eighth Semester (C.B.S.)

Elective-III : Machine Tool Design

P. Pages : 2 **NRJ/KW/17/4727**

Time : Three Hours * 0 2 8 2 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) What are the different Criterias for classifying Machine Tools. Discuss them in brief. **7**

b) State the parameters defining working motions of a Machine Tool. **4**

c) A 40 mm hole is drilled at a speed of 30 m / min and feed of 0.1 mm/tooth. Calculate the feed per minute of the operation. **3**

OR

2. a) Discuss elementary transmissions for transmitting Rotary motion. **4**

b) What are Hydraulic Drives. State & Explain its elements. **5**

c) What is the difference between Reversing and Differential Mechanisms. **5**

3. a) What is the aim of speed and Feed Rate Regulation. State various laws of stepped Regulation. **5**

b) What information is required for Designing a speed box initially? **4**

c) How the number of teeth of Gears are determined. **4**

OR

4. a) How are speed & feed boxes classified. **5**

b) Draw the structural diagrams of a m/c tool speed box $\eta_{min} = 16\,\text{rpm}$, $\eta_{max} = 770\,\text{rpm}$, and $\phi = 1.26$. Which layout is best? Why? **5**

c) What is Electro - Mechanical system of Regulation. **3**

5.	a)	What are the functions of Machine Tool Structures? What are Design Criteria for Machine Tool Structures?	**7**
	b)	Explain in detail Static and Dynamic stiffness of Machine Tool.	**6**

OR

6.	a)	State the factors affecting stiffness of Machine Tool structure and methods of improving it.	**6**
	b)	What are the Basic design procedure of Machine Tool structure taking into consideration all aspects of Design?	**7**
7.	a)	State the functions & types of Guideways. How are Guideways different from slideways.	**5**
	b)	How are Hydrodynamic slideways designed.	**5**
	c)	State various methods of Adjusting clearances in slideways.	**3**

OR

8.	a)	What are combination Guideways?	**3**
	b)	Discuss design criterias of sliding friction power screws.	**5**
	c)	What are Anti friction Guideways? How are they designed.	**5**
9.	a)	State the functions of spindle unit and its requirements.	**4**
	b)	What do you understand by optimum spacing between spindle support? Why is it necessary? How deflection of spindle axis due to compliance of spindle supports calculated.	**5**
	c)	What are the materials used for spindles. Discuss effect of selecting wrong material for spindles stating conditions.	**4**

OR

10.	a)	What are Anti friction Bearings? What are the number of possible combinations of various anti - friction bearings in m/c tool spindles.	**5**
	b)	What is preloading of Antifriction bearings?	**5**
	c)	Write short note on Hydrodynamic Journal Bearing.	**3**
11.	a)	What does a control systems of machine tool consists of? State the functions, requirements & classifications of these control systems.	**5**
	b)	State the objectives & Procedures for Acceptance test for Testing of Machine tools.	**4**
	c)	What do you understand by accuracy of machine tools & work pieces. What are the instrumentation for Acceptance of Testing of m/c tools.	**5**

OR

12.	a)	What are Technical & Economical Prerequisites of control systems in m/c Tools.	**7**
	b)	Explain Adapture control systems with example for m/c tools?	**7**

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