B.E. Mechanical Engineering Eighth Semester

MR8032 - Elective-II : Machine Tool Design

P. Pages : 2 **GUG/W/18/2072**

Time : Three Hours * 1 5 8 6 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q. 10.
3 Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Retain the construction lines.
6. Illustrate your answers wherever necessary with the help of neat sketches.
7. Use of non programmable calculator is permitted.

1. a) What are the essential requirements of Machine Tool? Explain. **6**

b) Explain why is it required to regulate speed and feed of m/c tool. What do you mean by slipped regulation and stepless regulation of? **6**

c) Explain working and auxiliary motions of m/c tool. **4**

OR

2. a) Explain 'Large values of ϕ are used on small sized m/c tool and small values are used on large m/c tools'. **6**

b) Calculate and tabulate RPM values and diameter range served by each step for the data – **10**
$N_{min} = 20\,rpm$, $N_{max} = 875 rpm$,
No. of speed steps = 12, Cutting speed = 15 m/min;
Initial diameter of workpiece = 240mm;
If RPM values constitute Geometric progression.
State your inference and explain why GP is used in m/c tool drives?

3. a) What do you mean by m/c tool structure? What are the requirements of m/c tool structures? **4**

b) Describe the design criteria for m/c tool structure, with suitable example. **8**

c) Write a note on Profiles of m/c tool structures. **4**

OR

4. a) For a feed box having feed range 0.1 – 1.11 mm/rev, in 2 stages with $\phi = 1.41$:- **8**
i) Draw the structural diagram.
ii) Analyse the structural diagram and
iii) Select the best possible version.

b) How are the speed boxes classified? Explain each type. **8**

5. a) What is the basic function of guide ways? What are the requirements that the guide ways must satisfy? **4**

b) With the help of neat sketches describe the various shapes of slideways. **6**

c) What are the various contribution of slideway profiles. Draw sketches and state the application of each. **6**

OR

6. a) Describe the various materials of slideways along with their properties and suitability. **8**

b) State the importance of clearance in slideways. With the help of neat sketches describe the commonly used devices for adjustment of clearance. **8**

7. a) Why is it required to protect slideways? Explain various protecting devices for slideways. Draw neat sketches. **8**

b) Write notes on – **8**
i) Hydrostatic slideways.
ii) Combination guideways.

OR

8. a) What for Power screws are used in m/c tools? State their features and describe the distinguishing characteristics of sliding-friction and Rolling-friction Power Screws. **8**

b) Describe the factors for which sliding friction power screws are designed. **8**

9. a) Describe ball recirculating power screw with their features, materials and thread profiles. **8**

b) What are the different materials for sliding friction power screw? Describe their thread profiles and methods of mounting. **8**

OR

10. a) Describe the function and requirements of spindle unit. **6**

b) What are the types of bearings used to support the spindle? What are the requirements of spindle support? And state the distinguishing features of Anti-friction bearings. **5**

c) Write a note on preloading of Antifriction bearing. **5**

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