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Total Number of Pages: 02

B.Tech  
PCMF4403

7<sup>th</sup> Semester Regular / Back Examination 2017-18

Machine Tool Design

BRANCH: MANUFAC, MANUTECH

Time: 3 Hours

Max Marks: 70

Q.CODE: B281

Answer Question No.1 which is compulsory and any five from the rest.  
The figures in the right hand margin indicate marks.

- Q1**      **Answer the following questions:**      **(2 x 10)**
- a) What are the functions of control system?
  - b) What is Oldham Coupling?
  - c) In the NC System what is the purpose of decoder?
  - d) What is direction control valve?
  - e) In the design of Push button in terms of Ergonomics consideration the button diameter and movement of push button should be \_\_\_\_\_ & \_\_\_\_\_ respectively?  
(a) 10-16mm, 1-20mm      (b) 12-15mm, 3-10mm  
(c) 5-18mm, 3-10mm      (d) 21-35mm, 8-10mm
  - f) Explain briefly the term coupling in machine tool design?
  - g) What is the difference between hydrostatic slideways and hydrodynamic slideways?
  - h) How in the control system for changing speed and feed, the preselective control system works?
  - i) Draw the structural diagram of the following arrangements?  
(i) 2(2)3(4)2(1)
  - j) What do you mean by coding system in Numerical control machines?
- Q2**      a) Describe transmission through CAM Mechanism with a suitable diagram?      **(5)**  
            b) What is the purpose of Valve? Explain Pressure relief valve with neat sketch?      **(5)**
- Q3**      a) What is speed chart of a gear box? Draw ray diagram and speed chart when  $i_{max} \leq 2$  &  $i_{min} \geq 1/4$ , Corresponding  $\Phi = 1.41$ ,  $n_{min} = 31.4$  rpm,  $n_{max} = 1500$  rpm,  $z = 12$  for the gear box arrangement of 2(3)3(1)2(6).      **(5)**  
            b) What are the design criteria for wear resistance analysis of slideways, explain with a schematic loading diagram for a combination of flat slideways under orthogonal cutting conditions?      **(5)**
- Q4**      a) Explain interpolation in Numerical control machines programs? What is the importance of interpolation in the programming during machining process?      **(5)**  
            b) What is open and closed loop system in NC Machine System, explain both in a block diagram?      **(5)**
- Q5**      a) What are the features of power Screw that it must bear for transmission purpose and derive the mathematical equation for designing the power screw for "wear resistance"?      **(5)**  
            b) What is the function and requirement of Spindle in Machine tool? Analysis for the deflection due to optimum spacing between spindle support?      **(5)**

- Q6** a) What is the role of clearance in the slideways mechanism? What are the methods for adjusting clearance in slideways? (5)
- b) Explain pump and mention its types? Explain Gear pump working principal along neat drawing? (5)
- Q7** What do you understand by Intermittent motion? Explain Ratchet Gear Mechanism with a neat sketch? (10)
- Q8** **Write short answer on any TWO:** (5 x 2)
- a) Machine tool structure.
- b) Belt Drive
- c) Gear BOX Mechanism.
- d) Break up of speed steps selection.