BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE   SEMESTER: V/ADD
BRANCH: PROD.   SESSION : MO/2018

SUBJECT : PE5003 MACHINE TOOL DESIGN

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1   (a)   What are the basic motions in any machine tools? Classify them with examples.   [2]
     (b)   A flat surface of length 120 mm and width 60 mm is to be machined by using shaping   [3]
           process in double passes. Calculate the total machining time if cutting velocity is 40
           m/min, feed is 2 mm/stroke and quick return ratio is 2:3. Assume approach and
           overtravel lengths are 5 mm, each.

Q2   (a)   What are the general design requirements of machine tools for safety and convenience   [2]
           of control?
     (b)   Explain with neat sketch the working principle of translatory hydraulic drive.   [3]

Q3   (a)   What is range ratio? How range ratio is determined using diameter ratio?   [2]
     (b)   How dual and decimal systems of geometric progression series is used to set the preferred   [3]
           values of Φ (common ratios)?

Q4   (a)   What is significance of stage restriction in a ray diagram?   [2]
     (b)   How Meander's mechanism is used for speed regulations in feed boxes?   [3]

Q5   Design a 9-speed gear box for transmitting 10 HP with speeds ranging from 50 rpm, with   [5]
           φ = 1.26. Select an optimum ray diagram. Calculate the number of teeth in each gear.

Q6   (a)   Draw E33 kinematic structure of cylindrical grinding machine with hydraulic table feed   [2]
           movement.
     (b)   How stepless speed regulations in a machine tool can be obtained by using cone variators   [3]
           with spherical intermediate members?

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