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

CLASS:   B Tech                                                        SEMESTER: IV
BRANCH:  MECH                                                          SESSION : SP/2020

**SUBJECT: ME211 MACHINE DESIGN**

TIME:   2 HOURS                                                        FULL MARKS: 25

**INSTRUCTIONS:**
1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

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|---|---|---|---|---|

Q1   Write short notes on the following:                               [5]   1,2   1
     (i) Notch Sensitivity   (ii) Goodman Diagrams   (iii) Fits  (iv) Factor of Safety
     (v) Cap Screws

Q2   The shaft of an overhang crank subjected to a force P of 1 kN is shown in Fig.   [5]   1,2,3   3
     1. The shaft is made of plain carbon steel 45C8 and the tensile yield strength
     is 380 N/mm$^2$. The factor of safety is 2. Determine the diameter of the shaft
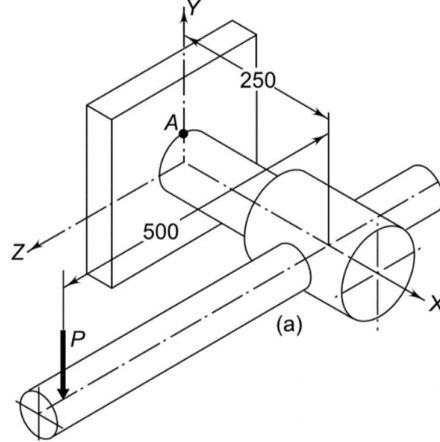     using the maximum shear stress theory.



Fig. 1 (all the dimensions are in mm)

Q3   Explain cumulative damage in fatigue.                             [5]   1   2

Q4   A steel plate, 100 mm wide and 10 mm thick, is welded to another steel plate   [5]   1,2,3   3
     by means of double parallel fillet welds as shown in Fig. 2. The plates are
     subjected to a static tensile force of 50 kN. Determine the required length of
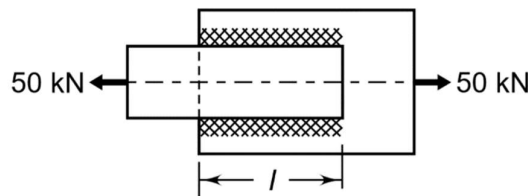     the welds if the permissible shear stress in the weld is 94 N/mm$^2$.



Fig. 2

Q5   Classify the threaded fasteners and discuss in brief, about the advantages and   [5]   2   4
     disadvantages of this fastners.

**:::::: 03/03/2020 ::::::E**