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ITL-703 Fundamentals of Tribology
Minor Test I-2015

3·5

Time 1 hr   **Total Marks 40**

Answers should be brief & to the point. Answers to Q3 should be tried on the question paper.

Q1-   **(15)**

  a. Show chemical composition of surface   **(2)**

  b. Show the appearance of surface with special attention to roughness and related features such as defect, waviness & width, lay direction etc.   **(2)**

  c. Define R_a and R_q, R_{tm} and R_z with figs $(1+1+1.5+1.5=5)$

  d. What is form error?   **(1)**

  e. Describe how Greenwood & Williamson's Theory derived for purely elastic contact can be useful for predicting the onset (show in Fig) of plastic flow at asperities   **(5)**

Q2-   **(19)**

  a. What are Amonton's laws of friction. What is Coulomb's law? Explain its validity for various classes of materials   **(7)**

  b. Explain Bowden & Taber theory derived for prediction of coefficient of friction. What are the limitations?   **(7)**

  c. Which factors directly control frictional heat produced at the surface?   **(2)**

  d. In case of Hertzian contact when a sphere of elastic material is pressed against a plane under load **w** and contact circle radius is **a**, write formula for; **(a)** The area of contact & **(b)** Elastic modulus of composite junction   **(3)**

Q3- Fill in the blanks or tick right word $(0.5 \times 12 = 6)$

  (a) Chiesel edge stylus is ~~more~~/less sensitive than the conical one because... It enters in all asperities where conical one can not enter.

  (b) To avoid strong adhesion, mating metals should be ductile (Y/~~N~~); soft (Y/~~N~~); of same crystalline structure (~~Y~~/N); and dissimilar (Y/~~N~~)

  (c) The more similar the crystal structure of two surfaces, less/~~more~~ readily they will weld.

  (d) For high friction and wear, materials should have (i)... Soft ... (ii) High Surface irregularity (iii)... High Surface ...energy (iv)... high Surface ... & (v)... high mutual solubility. Reactivity