(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2103 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2012-13

MANUFACTURING SCIENCE—II

Time : 3 Hours *Total Marks : 100*

Note : *(1) Attempt **all** questions.*

(2) They carry equal marks. However, marks for each part/subpart of the question are shown against each.

1. Attempt any **FOUR** parts of the following : **(5×4=20)**

(a) A lathe right hand turning tool has the following tool signature (A.S.A.) :

15°, 15°, 10°, 10°, 15°, 10°, 3 mm.

Ascertain the inclination (obliquity) angle, orthogonal rake and approach angle in O.R.S. nomenclature. Will this tool cut orthogonally ?

(b) What do you understand by different "mechanisms of wear" ? Describe the major ones which play an important part in wear of tools.

(c) What properties should a good cutting tool material have ? Does a tungsten carbide tool have these properties ? How can the performance of a tungsten carbide tool be improved further ?

(d) What do you understand by high-efficiency zone of cutting ? Explain in reference to economics of machining.

(e) What are the causes of vibration and chatter during machining ? How can vibration and chatter be avoided while turning on a centre-lathe ?

(f) What is value of shear angle according to Ernst-Merchant, Lee and Schaffer, Staller and Merchant's revised theories ?

What basic assumptions were made by Ernst-Merchant, while ascertaining the value of shear angle ?

2. Attempt any **FOUR** parts of the following : **(5×4=20)**

(a) Make a schematic diagram of a Shaper's driving mechanism. Before the actual machining of a job can begin, certain adjustments in length of the stroke (to suit the job in question) etc. have to be done. Explain, with the help of sketch drawn, how these adjustments are accomplished.

(b) What time-saving devices are provided on a Capstan Lathe which are not there on centre Lathes ?

(c) Describe the operation of deep hole drilling ? What difficulties, one expects in deep hole drilling and how are they overcome ?

(d) Show that t_{av}, average chip thickness in slab milling operation is given by :

$$t_{av} = \frac{f\sqrt{d(D-d)}}{N_Z D}$$, where

f is the table feed, D is the cutter diameter, d is the depth of cut, N is the cutter r.p.m. and Z is number of teeth in the cutter.

(e) Describe a vertical boring mill. What kind of operations may be performed on this machine? What is the difference between this machine and a vertical turret Lathe ?

(f) What is meant by symmetrical and asymmetrical milling while machining a flat surface with a face-mill ? Which procedure is superior and why ? Again a flat surface can be generated by slab milling process. Will face milling or slab milling give better dimensional accuracy and finish and why ?

3. Answer any **TWO** parts out of the following : **(10×2=20)**

(a) What are the important considerations, which should be taken into account while selecting a grinding wheel for a particular application ? Explain, in particular, the terms, grit, grade and structure.

(b) What is the object of the following processes :

(i) Honing

(ii) Lapping

(iii) Buffing ?

Explain how honing is done.

(c) Explain the following terms :

(i) C.L.A. method of measuring surface finish,

(ii) Selective interchangeability,

(iii) Standardisation and its advantages,

(iv) Limit gauging, and

(v) Transition fit.

4. Attempt any **FOUR** parts of the following : **(5×4=20)**

(a) Describe the manual D.C.S.P. arc-welding process with coated electrodes. Give an idea of the voltage and current employed. What is meant by arc-blow ?

(b) What is the difference between arc-welding and E.R.W. process ? Describe the process of Spot welding and the welding cycle employed.

(c) Describe the metallurgical and other changes which take place in HAZ associated with arc-welding. What is meant by carbon-equivalent of steel and what role is played by it during welding of steel ?

(d) What do you understand by radiographic quality of welds ? How is radiographic quality of welds checked ?

(e) Name some welding processes which may not need use of any electrical power. Describe the details of any one such process.

(f) Bring out the differences between T.I.G. and M.I.G. processes of welding.

5. Attempt any **TWO** parts of the following : **(10×2=20)**

(a) Discuss, briefly the use of Laser beams in welding and machining of materials.

(b) Describe the atomic hydrogen and friction welding processes.

(c) Describe the use of ultrasonic waves in welding and machining. Describe the properties of material for which such processes are most effective.