

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

**PAPER ID : 2103**

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

**B.Tech.**

(SEM. V) THEORY EXAMINATION 2011-12

**MANUFACTURING SCIENCE—II**

*Time : 3 Hours*

*Total Marks : 100*

**Note :—**Attempt **all** questions. They carry equal marks.

1. Answer any **four** of the following : **(4×5=20)**
  - (a) Describe the mechanics of chip-formation. Derive an expression for shear strain in a chip, assuming orthogonal cutting.
  - (b) What is meant by "cutting-speed" ? What are the recommended values of cutting speed for turning mild steel with H.S.S. and Tungsten carbide tools ? If turning is done at higher than recommended speeds, what harm is there ?
  - (c) Write a short note on "wear" of tools. What are the locations, where wear usually occurs ? How can the tool wear be minimised ?
  - (d) While machining a 20 mm diameter thin pipe on a lathe, the length of chip for one revolution of pipe was measured and found to be 40 mm long. Tool had a rake angle of  $10^\circ$ . Determine the shear angle.

- (e) What are the values of shear angle as predicted by theories propounded by (i) Ernst-Merchant, (ii) Lee and Schaffer, and (iii) Stabler ?

What assumptions were made by Ernst-Merchant, on which the value of shear-angle was based ?

- (f) What is the difference between T-series and M-series of high speed steel ? Mention the approximate chemical composition of at least one T-series and one M-series H.S.S.

2. Answer any **two** of the following : **(2×10=20)**

- (a) What time saving devices are provided in the design of a capstan lathe in comparison with a centre lathe ? Explain what is a tool layout chart.
- (b) Calculate the time required for drilling a 20 mm diameter hole in a 15 mm thick m.s. plate. A feed rate of 0.15 mm per revolution and a lip angle of  $118^\circ$  for the twist drill may be assumed. Cutting speed for m.s. = 25 metres/minute.
- (c) Describe the mechanism of a dividing head and explain how it is used for indexing a work-piece e.g., a gear blank. Explain the difference between simple indexing and compound indexing.

3. Answer any **four** of the following : **(4×5=20)**

- (a) What are the common abrasives used in a grinding wheel ? Which abrasives are recommended for grinding (i) medium carbon steel and (ii) brass ?

What is meant by GRIT size and state its effect on ground surface.

- (b) Justify the common saying that recommends use of hard wheels for soft materials and vice-versa. What is meant by G-ratio ?
- (c) What is the advantage of centreless grinding ? Describe this process. Why is it called centreless ? Explain the terms (i) through feed (ii) Infeed and (iii) End feed.
- (d) How is surface finish expressed quantitatively ? Describe the C.L.A. and R.M.S. methods of doing so. What is the difference between surface texture and surface finish ?
- (e) Describe briefly "honing" process. What is the object of this process ?
- (f) State and explain Taylor's principles of gauge design.
4. Answer any **four** of the following : (4×5=20)
- (a) Describe the essential difference between leftward and rightward gas welding techniques.
- (b) What is meant by "heat affected zone" in welding ? What metallurgical changes may take place in this zone during arc welding of medium carbon steel and how can sound welding be done ?
- (c) What are the functions of electrode coating ?
- (d) What is the principle of E.R.W. process ? Describe a typical E.R.W. process cycle for spot welding.
- (e) Describe the submerged arc welding process. What are the advantages and disadvantages of this process ?

- (f) Differentiate between welding, brazing and soldering processes. Which process results in the strongest joint and why ?

5. Answer any **two** of the following : **(2×10=20)**

- (a) What is "Explosive" welding ? Which explosives are commonly used ? Describe an explosive welding set-up. Will the bond strength between two materials joined by explosive welding process be as high as that obtained by conventional welding techniques and why ?
- (b) Describe the principle of ECM process. What is meant by "current-density" and current-efficiency ? What is the object of masking ? What are the advantages associated with this process ?
- (c) (i) Describe the use of Laser beams in welding and machining processes.
- (ii) Give an account of electron beam machining. Mention some typical applications. What advantages and disadvantages are associated with this process ?