(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 ?

(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°. 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° 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 grindging 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 ?