B. MECHANICAL ENGINEERING (Part Time) 2nd Year 2nd Semester Examination 2018

MANUFACTURING PROCESS

Time: 3hrs. Full Marks: 100

Answer any *five (5)* questions of the following.
Use pencil for drawing works.
The figures in the margin indicate full marks.

1. (a) Discuss, with a neat figure, the green sand molding technique using a reversing gear handle of lathe as a pattern. Mention about the commonly used hand tools in molding process.
   (b) What is meant by sand additive and binder? Give some examples of the same. How clay content in a sand sample is tested in laboratory? (8+2) + (6+4) = 20

2. (a) Drawing necessary figures discuss about major casting defects with possible remedies.
   (b) What is 'riser' or 'feeder' in casting? Drawing adequate figures discuss about different types of risers. What is meant by 'hot tops'?
   (c) What should be the ideal shape of a riser and why? Discuss in detail using mathematical formula in this regard. 6 + (2+4+2) + 6 = 20

3. (a) What is 'precision or investment casting'? State the important advantages and limitations of this process? Name the important precision casting processes.
   (b) Discuss in details about Shell molding process. Draw necessary diagrams.
   (c) How the permeability of plaster of paris mould can be increased?
   (2+4+2) + 8 + 4 = 20

4. (a) Define the term 'core', 'core prints' and 'chaplets'. Draw figures of covered core, double headed perforated chaplet, location of external chills in 'L' and '+' joints (showing the probable locations of porosity in those cases).
   (b) Discuss about skeleton pattern and sweep pattern. What are the different color codes in pattern? (6+6) + (6+2) = 20

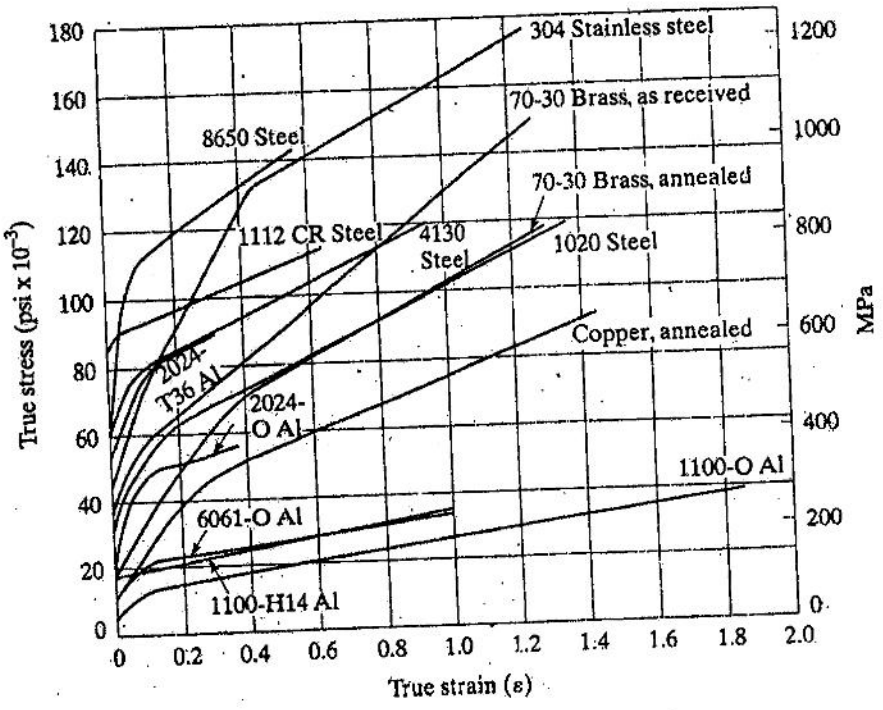
5. (a) Deduce the expression for coefficient of spread as given by Tomlinson and Stringer. Why a barrel shape is generated during upsetting operation?
   (b) A solid cylindrical slug of 304 SS is 150mm in diameter and 100mm high. The height is to be reduced by 30% by hot, open die forging. Assuming a coefficient of friction of

0.5 calculate the forging force needed at the end of stroke. The necessary graph is given below. (8+2)+10=20

6. (a) Show that the strip velocity at exit is much higher than that of at entry during a flat rolling operation. What is 'forward slip', 'no slip' point and 'draft' in rolling?
   (b) Determine the expression for maximum possible thickness reduction during flat rolling operation. Draw necessary figure, indicating the parameters used, in this regard. (6+2+2+2) + 8 = 20

7. (a) What is meant by fusion welding and pressure welding? Classify different welding processes in these categories drawing a chart.
   (b) What are the power sources in arc welding? Mention there advantages and limitations.
   (c) How acetylene gas is preserved in gas cylinder?
   (d) What is the theory behind oxy-fuel flame cutting? 6 + 6 + 6 + 2 = 20

8. Write explanatory note on the following:
   (a) Flash butt and upset butt welding
   (b) MIG **or** TIG welding
   (c) Electron theory of arc column
   (d) Importance of coating materials in welding electrode $4 \times 5 = 20$



Graph of true stress vs. true strain in connection with question no. 5(b).