Total No. of Questions—8]　　　　　[Total No. of Printed Pages—4+1

Seat No.	

[5057]-2013

S.E. (Mechanical Engineering) (First Semester) EXAMINATION, 2016

MANUFACTURING PROCESS–I

(2015 PATTERN)

Time : Two Hours　　　　　　　　　　**Maximum Marks : 50**

N.B. :— (*i*) All questions are compulsory i.e. Solve Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** Q. No. **7** *or* Q. No. **8**.

　　　　(*ii*) Figures to the right indicate full marks.

　　　　(*iii*) Assume suitable data, if necessary.

　　　　(*iv*) Neat diagrams must be drawn wherever necessary.

1. (*a*) State the different types of moulding sands. With a sketch explain the method to test the porosity of a moulding sand. [6]

　　(*b*) Using Chvorinor's rule find the ratio of solidification time for a cube shape casting to a sphere shape casting. The volume of the cube shape casting (having side '*a*') and sphere shape casting (radius '*r*') is 1000 cm^3. Assume value of mould constant is same for both cube and sphere shaped castings. [6]

P.T.O.

Or

2. (*a*) State the importance of flow stress and strain rate in metal forming. Also, show with a plot the effect of temperature on yield strength and ductility of material in metal forming. [6]

(*b*) A billet having initial diameter of 50 mm is directly extruded to a diameter of 30 mm. The length of the billet is 100 mm. For the work metal strength coefficient 'K' is 600 MPa and strain hardening exponent 'n' is 0.1. Take the values of the constants in Johnson formula 'a' and 'b' as 0.8 and 1.3 respectively. Find true strain, extrusion strain, average flow stress and ram pressure at length of billet is equal to 75 mm. Assume shape factor as unity. [6]

3. (*a*) With a neat sketch explain the working principle of pressure thermoforming. [6]

(*b*) With a schematic write down the steps to be followed in compression moulding for thermoplastics. [6]

Or

4. (*a*) State the *six* points of differences between A.C. welding and D.C. welding. [6]

(*b*) With neat sketches state the characteristics of different types of gas flames. [6]

5. (a) Name the different types of dies according to the type of press operation and method of operation that are used in sheet metal working. Also, draw a neat sketch of compound die wherein punching and blanking operation are performed simultaneously. [6]

(b) Design a strip layout for manufacturing a mild steel component as shown in figure. The thickness of the component is 1 mm. Take ultimate shear stress value as 200 N/mm^2. Also find the percentage utilization, centre of pressure and press capacity. Comment on how to increase the percentage utilization of the sheet. The dimensions shown in figure for the component are in mm : [7]
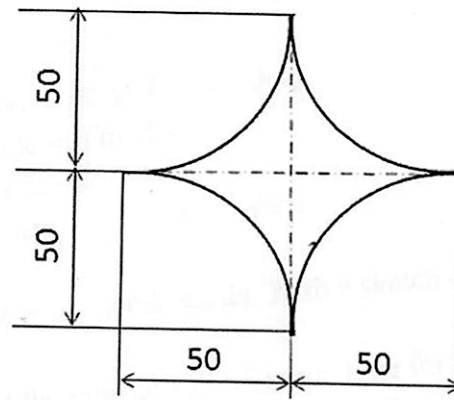
Or

6. (a) Explain with sketches various types of pilots used in sheet metal working. [6]

(b) A cup of internal diameter 60 mm, height 80 mm is to be drawn from a 2 mm cold rolled steel. The corner radius for cylindrical cup is 1.8 mm. Percentage reduction permitted in the first draw is 50% and in the second, third and fourth draw is 30%, 20% and 15% respectively. Consider trimming allowance of 3.2 mm for each 25 mm of cup diameter. Find size of the blank, number of draws required, punch and die dimensions for each draw. Also, draw sectional view of die block showing different dimensions for last draw. Consider value of punch and die clearance as 1.15 times thickness of sheet. [7]

7. *(a)* State the importance of lathe centres, lathe dogs/carrier and mandrels while machining on lathe. [6]

(b) A hollow workpiece of 80 mm diameter and 150 mm length is to be turned down to 72 mm for length. The maximum allowable depth of cut is 1 mm. Assume feed as 0.3 mm/rev and cutting speed as 3 metre per seconds. If the approach length is 30 mm and over travel is 20 mm then calculate the machining time. If feed changes to 0.5 mm/seconds keeping the cutting speed as same given above, then calculate the machining time and percentage change in machining time due to change in feed from 0.3 mm/rev to 0.5 mm/second. [7]

Or

8. (*a*) What is all geared head stock ? State its advantages and limitations in comparison to belt driven lathes. [6]

(*b*) Calculate the change gears for cutting three start right hand threads of 1.8 mm pitch on a lathe having 4 mm pitch of lead screw. Available gears are 20 to 120 teeth in steps of 5 teeth. Also suggest two more alternative solutions for change gears other than obtained in the earlier step. Sketch the gear train and suggest what modification is required for cutting left hand threads ? [7]