BITS, PILAN I – DUBAI

First Semester 2010-2011

III Year Mechanical
MEC 342 Production Techniques — Comprehensive Examination
Date: 28-12-10 — Weightage: 35%
Time: 3 Hrs.

#	**Answer all questions** **Assume suitable data, if required** **Answer the questions sequentially**
	Part I (5x2=10 Marks)
1	Illustrate (sketch) any two types of fracture mechanisms common in materials.
2	Specify the parts of a drawing die with the help of a sketch.
3	List any two defects associated with extrusion and specify the reasons.
4	Define ring rolling.
5	Draw a creep curve and show how the creep rate can be calculated.
	Part II (5x6=30 Marks)
6	Explain the electro discharge machining process with a sketch and specify the applications of the process.
7	a. Explain the different forging defects. (sketches and reasons). b. Compare the different presses used for forging.
8	Write short notes (with simple sketches) on a. Hemming & Seaming b. Stretch flanging & Shrink flanging c. Springback compensations
9	Explain any five casting defects. (sketches, reasons and remedies are expected)
10	With a simple sketch, explain the shell moulding process. List the advantages and specify two of its applications.

<table>
<tr><th colspan="2">Part III (5x6=30 Marks)</th></tr>
<tr><td>11</td><td>Data related to surface grinding process is given below.
Depth of cut = 0.01mm; Power = 2kW; Table feed = 50mm/s; Specific grinding energy = 20 W-s/mm^3; width of work piece=25mm; spindle speed =1000rpm; Determine the power required for grinding operation and the related cutting forces.</td></tr>
<tr><td>12</td><td>For the following data related to drilling operation, determine the thrust force, torque, drilling time and material removal rate.
Spindle speed = 20 m/min; point angle = 120°; feed rate for drill = 0.3mm/rev; specific cutting energy for the material = 2 W-s/mm^3; Depth of the hole = 5mm and Diameter of the hole = 25mm.</td></tr>
<tr><td>13</td><td>Data related to slab milling process is given below.
Length of the work piece = 30cm; width of the work piece = 10cm; depth of cut = 2mm; feed =0.025cm/ tooth; number of teeth = 20; spindle speed=200rpm and specific cutting energy for the material = 3 W-s/mm^3;. Determine the following: MRR; Power required for milling; Torque and time for milling.</td></tr>
<tr><td>14</td><td>Ultrasonic machining was performed on a glass plate. The material removal rate was found to be 500mm^3/min. Considering the following cases determine the change in MRR.
a. Diameter of the grit is increased by 50%.
b. Increase in amplitude by 25% and decrease in concentration of abrasive particles by 30%.
c. Increase in work piece strength by 25%.</td></tr>
<tr><td>15</td><td>Following data is related to electrochemical machining operation. Select a suitable material for machining (from the table given below) if the current rating is 270 amps for the machine and required MRR is 600mm^3/min. Justify your selection. Take F =96500Coloumbs.
<table><tr><td></td><td>Iron</td><td>Aluminium</td></tr><tr><td>Density, g/cc</td><td>7.8</td><td>2.7</td></tr><tr><td>Atomic weight, g/mol</td><td>56</td><td>27</td></tr><tr><td>Valency</td><td>2</td><td>3</td></tr></table></td></tr>
</table>

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First Semester 2010-2011

III Year Mechanical
MEC 342 Production Techniques **Test 2 Open book**
Date: 11-12-10 **Weightage: 15%**
Time: 50 min.

#	**Answer all questions** **Assume suitable data, if required** **Text books and hand written class notes are permitted**	**Marks**
1	The tool life and the cutting parameters (speed (V), feed (f) and depth of cut (d)) related by the equation $V^2 f^{1.5} d^{0.5} T = 100$. Derive an expression for optimum feed for maximum production.	[6]
2	You are cold drawing a part that has an initial diameter of 32 mm and a final diameter of 11 mm. The initial length of the billet is 37 mm. The length of the drawn section is 105 mm. The metal has K = 1275 MPa and n = 0.45. The equipment has a power of 65 kW. Determine the maximum possible ram speed.	[6]
3	Consider the machining of the outside of a cylindrical work piece (350mm dia.) with a single point tool on a lathe. The outside surface needs to have an average surface roughness of 150 nm. Your cutting tool has a radius of 50 μm. The cutting tool cannot be used above 1320°C. The specific cutting energy of the mirror metal is 3.5 W-s/mm3. t=0.25mm, k=43.6 W/m°C; ρ=7200kg/m3; Cp=50J/Kg°C. Determine the following: a) The appropriate feed rate b) The appropriate lathe rpm	[6]
4	The data related to cup drawing is given below: Inner diameter = 75mm; height of the cup = 45mm; thickness = 2mm; starting diameter = 150mm; punch / die radius of curvature = 4mm; tensile strength = 400MPa and yield strength = 180MPa. Determine the following: a. Drawing ratio b. Reduction c. Drawing force and d. Blank holding force	[6]
5	Derive expressions for contact length and average flow stress used for rolling.	[6]

BITS, PILANI – DUBAI

First Semester 2010-2011

III Year Mechanical
MEC 342 Production Techniques **Test 1**
Date: 24-10-10 **Weightage: 15%**
Time: 50 min. **Marks: 5x6 =30**

#	**Answer all questions** **Assume suitable data, if required**	**Marks**
1	An iron cannon ball with a diameter of 20cm is manufactured through sand casting. Shrinkage is assumed to be 4% for the material used. Determine the diameter and height of the riser for sound casting.	[7]
2	The sand casting to be produced is a hollow cylindrical solid with an outer diameter of 20 cm, an inner diameter of 18 cm, and a height of 40 cm. The mould is top gated and the entire top area is used for pouring. The solidification constant used for the mould material is 2 seconds/ mm^2. Determine the mould filling time and solidification time.	[7]
3	The standard test to determine the ability of a material to withstand loads due to rotation was conducted on a steel tube with corresponding modulus of 80GPa. The average radius and the length of the specimen were 20mm and 150mm respectively. Find the thickness of the tube, if the twist is 0.2radians.	[6]
4	A seamless tube manufacturer wanted to test a new material for manufacturing tubes using rolling-piercing method. He conducted the standard test for estimating tensile stress required for piercing. The dimensions of the specimens are as follows: diameter = 30 mm; thickness = 2mm; and the fracture load is 500N. Determine the tensile stress.	[6]
5	With simple sketches, briefly explain the following: a. Blister b. Scab c. Pin holes d. Misrun	[4]

BITS, PILANI – DUBAI

First Semester 2010-2011

III Year Mechanical
MEC 342 Production Techniques **Quiz 2**
Date: 9-12-10 **Weightage: 5%**
Name : **ID No.:**

1. Name the costs related to tool failure in machining economics.[1]
2. Differentiate punching and blanking.[1]
3. What do you mean by formability limiting diagram? Sketch a sample diagram. [2]
4. With a simple sketch, show the different zones of heat sources in metal cutting.[2]
5. Name the different types of chips formed during machining.[1]
6. Define build up edge.[1]
7. Name the two important parameters which affect the surface roughness in machining.[1]
8. List the different velocities associated with metal cutting.[1]

BITS PILANI – DUBAI
ACADEMIC CITY, DUBAI

DATE: ~~08~~ 24-11-10
COURSE: ME C342 Production Techniques **Quiz1**
CLASS: III Yr Mechanical
Marks: 10 **Weightage: 5%** **Time: 20min.**

1. **Sketch the draft allowance and specify its advantage. [2]**
2. **Compare engineering stress-strain and true stress -strain through a graph and specify the relationships between them. [2]**
3. **Name the tests used for determining impact strength. [1]**
4. **List the steps involved in investment casting. [1]**
5. **Sketch the pseudo vena contracta in a mould and specify the significance of it. [2]**
6. **What is the limiting Reynolds number for metal flow? What will be its impact? [1]**
7. **What is the major difference between hot chamber and cold chamber processes in die casting? [1]**