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## Manipal Institute of Technology, Manipal



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(A Constituent Institute of Manipal University)

## VII SEM. B.TECH (INDUSTRIAL AND PRODUCTION ENGINEERING) END SEMESTER (MAKE UP) EXAMINATIONS, DEC 2015 / JAN 2016

## SUBJECT: THEORY OF METAL FORMING (MME- 413) **REVISED CREDIT SYSTEM**

Time: 3 Hours. MAX.M.			
	<ul> <li>Instructions to Candidates:</li> <li>Answer ANY FIVE FULL questions.</li> <li>Missing data, if any, may be suitably assumed.</li> <li>Draw neat sketches using pencil only.</li> </ul>		
1A)	Sketch and describe following forging presses i) Mechanical forging press ii) Hydraulic press	(05)	
1B)	Calculate forging load required to transform a 1m long, 1m diameter cylindrical bloom into a Hexagonal section with approximately 0.35m in a hydraulic press. If the uniaxial flow stress is 450 Kg/cm <sup>2</sup> . Assume (a) a case with partial lubrication, $\mu = 0.3$ (b) a case with sticking friction	(05)	
2A)	Derive an expression for forging pressure under the conditions of plane strain.	(05)	
2B)	Calculate the rolling load if steel sheet is hot rolled 30 percent from a 40mm thick slab using a 900mm diameter roll. The slab is 760mm wide and coefficient of friction is 0.30. The plane stress is 140Mpa at entrance and 200Mpa at the exit from the roll gap due to increasing velocity. Also determine the power required if N=200rpm.	(05)	
3A)	In a wire drawing operation, determine the drawing stress and total drawing load using Following data Initial wire diameter = 8mm Final wire diameter =7.2mm Die angle = $18^{\circ}$ Die land = 4mm Coefficient of friction = 0.15		

Yield stress = 28kg/mm<sup>2</sup>

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3B)	Derive an expression for total drawing stress under the conditions of plane strain.				
		(06)			
4A)	Sketch and describe die construction for drawing process.				
4B)	Determine the maximum reduction per pass in a wire drawing using the following data Coefficient of friction =0.12				
	Die angle =18°	(04)			
4C)	Sketch and explain tube drawing by moving mandrel method				
5A)	In a tube drawing process a steel tube having inside diameter of 52mm and wall thickness 2.6mm is to be reduced to 50mm inside diameter and wall thickness of 1.8mm. Taking die angle 24° and coefficient of friction 0.12 compare the pipe drawing force for i) Floating mandrel				
	ii) Movable mandrel	(06)			
5B)	Sketch and explain super plastic forming operation.	(04)			
6.	<ul> <li>Explain the following forming processes</li> <li>i) Explosive forming</li> <li>ii) Electro hydraulic forming</li> <li>iii) Electro magnetic forming</li> <li>iv) Metal spinning</li> </ul>	(10)			