MANIPAL INSTITUTE OF TECHNOLOGY
A Constituent Institute of Manipal University, Manipal

Reg. No.										

VII SEMESTER B.TECH. (INDUSTRIAL AND PRODUCTION ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: THEORY OF METAL FORMING [MME 413]

REVISED CREDIT SYSTEM
(28/11/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitable assumed.

Explain the following forming processes

1A. i) Explosive forming **5**

ii) Electro hydraulic forming

1B. Calculate the temperature rise in titanium alloy subjected to a deformation strain of 1.0. Assume the deformation is adiabatic. Given ρ=7.85 $x10^3$kg/m^3,σ_o=800MPa, C=0.46$x10^3$ J/kg^{o}C, β=0.95 **2**

1C. Explain with sketch Recovery, Recrystallisation and Grain growth **3**

Explain the following forming processes

2A. i) Magnetic pulse forming **5**

ii) Spinning

2B. Explain lubrication in metal forming **2**

2C. A steel wire is drawn from an initial diameter of 12.5mm to a final diameter of 10.0mm, at the speed of 120m/min. The half cone angle of die is 6^o and the coefficient of friction at the die –wire interfaces is 0.12. A tensile test on the steel specimen has shown a yield stress of 210N/mm^2.Determine the draw force and the power required assuming that there is no back tension applied. **3**

3A. With neat sketches explain rod drawing and wire drawing. **5**

3B. Explain high velocity extrusion **2**

3C. Derive an expression for extrusion force. **3**

4A. Calculate the rolling load if a steel sheet is hot rolled from a 40mm thick slab of width 760mm. The reduction in thickness achieved is 30% and the roll **5**

diameter is 900mm. The plane strain flow stress is 140MPa at the entrance and 200MPa at the exit from the roll gap because of the increasing velocity. Assume the coefficient of friction = 0.3. If the roll speed is 100rpm what is the power required to drive the rolls?

4B. Explain residual stress in Forging **2**

4C. Derive an expression for Von Mises Yield Criterion **3**

5A. Calculate the forging load required to transform a 1m long 1m diameter cylindrical bloom into a square section of equal area in hydraulic press. Assume σ_o = 45MPa, plain strain and sticking friction with m=1 as conditions for forging. **5**

5B. Sketch and explain hydrostatic extrusion process **2**

5C. With neat sketches explain different methods for production of seamless pipe. **3**

6A. Write a note on following **10**

i) Experiments in metal working
ii) Slipping and Twining
iii) Isothermal Forging
iv) Deep Drawing
v) Fine Blanking