Code No: 56062 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, December - 2018
MECHANICAL WORKING OF METALS
(Metallurgy and Materials Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Why the principal stress axes always the same as the principal strain axes in an orthotropic material?
b) The in-plane stain at a point in a thin walled material is estimated to be $\varepsilon_{xx} = 100 \times 10^{-6}$, $\varepsilon_{yy} = -50 \times 10^{-6}$, $\gamma_{xy} = 100 \times 10^{-6}$. Determine the principal strains and the principal directions. [8+7]

2.a) Explain the effect of temperature, strain rate, microstructure and friction in metal forming.
b) Define engineering stress, engineering strain, true stress and true strain and derive the relation between them. [7+8]

3.a) Define Recrystallization and describe its importance in hot working.
b) Classify the metal forming processes? Write their merits, demerits and applications. [7+8]

4.a) What do you understand by forging? What are the advantages?
b) Classify the types of forging machines and explain any one. [8+7]

5.a) List the functions of Back-up rollers in rolling operation.
b) Classify the types of rolling mills and sketch them. [8+7]

6.a) Explain with a neat sketch the roll forging process.
b) Distinguish between hot and cold rolling process. [8+7]

7.a) Explain the forward and back extrusion process.
b) Describe hydrostatic extrusion process. [8+7]

8.a) Explain about pure drawing and pure stretching with simple sketch.
b) Explain the type of stresses involved in tube and wire drawing process. [7+8]

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