Subject Code: H0407/R13

M. Tech –II Semester Regular/ Supply Examinations, October, 2015

MATERIALS TECHNOLOGY

(Common to CAD/CAM, AMS and AM&MSD)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) Define work hardening. Explain about the Grain boundary strengthening.
   b) Explain the deformation of non-crystalline material.

2. a) Explain the Griffith's criterion used for smaller cracks. What is Griffith's crack length? Explain.
   b) What is the difference between Precipitation Hardening and Dispersion Hardening? By giving a suitable example elucidate the mechanisms for precipitation strengthening. Enumerate in detail the underlying deformation mechanisms for underaged, peak aged and overaged conditions of the alloy system

3. a) What is DBTT? Explain its significance.
   b) Brittle fracture is more prevalent at low temperature – Explain

4. a) What is the effect of stress concentration on fatigue? Explain.
   b) What is Paris law? Explain the crack initiation and propagation mechanism.

5. Write short notes on the following:
   a) Size effect on fatigue
   b) Surface effects on fatigue.

6. a) What is the criterion for selecting the materials based on service requirements, cost and motivation?
   b) What are metallic foams? Explain their important characteristics and applications.

7. a) Write down the compositions and applications of HSLA and TRIP steels.
   b) What are structural ceramics? Discuss about the processing of structural ceramics.

8. a) Discuss about polymeric materials and their molecular structures.
   b) Write down the properties, processing techniques of WC and SiC materials.Give their applications.

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Subject Code: H4308/R13

M. Tech –II Semester Regular/ Supply Examinations, October, 2015

SPECIAL MACHINES

(Common to PE, P&ID, PE&ED, PE&D and EM&D)

Time: 3 Hours **Max Marks: 60**

Answer any FIVE questions

All questions carry EQUAL marks

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1. a) What is a step angle? How to calculate step angle?
   b) Calculate the stator pole pitch, rotor pole pitch and full step angle of a 12/8 VR stepper motor.

2. a) What is the need for closed-loop control of stepper motors? Also compare closed-loop control with open-loop control.
   b) Draw the block diagram and explain the open-loop control of stepper a motor.

3. What are different merits of Permanent Magnet Synchronous Motors (PMSM)? Explain the vector control of PMSM.

4. What is the reason for torque ripples in switched reluctance motors? With a block diagram, explain in detail the torque control of a switched reluctance motor.

5. What are the merits of brushless DC motors? With a neat block diagram, explain the closed loop control of a BLDC motor.

6. a) What are current controllers? Explain hysteresis current control scheme
   b) Prove that the PM BLDC machines have 15% more power density than the PMSM.

7. a) Explain different applications of servo motors.
   b) Explain the principle of operation of AC servo motor.

8. a) Explain different types and applications of linear motors.
   b) Discuss the application of Linear Induction Motors for electric traction.

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