Paper Code: EME-063	**Roll No.**									

B.Tech.
(SEM VIII) EVEN SEMESTER EXAMINATION 2015-16
ADVANCED MATERIALS TECHNOLOGY

[Time: 3 hrs.] **[Max. Marks: 100]**

Note: Attempt all 5 questions as instructed. All questions carry equal marks. Draw figures wherever needed. Assume suitably any missing data/information, if any.

Q.1 Answer any two of the following **[10 x2 = 20]**

(a) Explain that 'the driving-force behind every technological-revolutions there has been certain materials'. Also, enlist 5 materials as possible-candidates for next possible-revolution and briefly mention two-lines for each.

(b) It can possibly said that stress-strain diagram of a material is like 'horoscope of material' within-which are hidden the several important mechanical-properties; explain this fact, with the help of the stress-strain curve for mild steel. Also explain 'Strain-hardening' and 'Necking' through the diagram.

(c) Write short notes on :- types, composition, property and application of *any two* of the following:
- (i) Carbon Steels
- (ii) Alloy Steels
- (iii) Cast Irons

Q.2 Answer any two of the following **[10 x2 = 20]**

(a) Draw a neat sketch of Fe-C equilibrium diagram showing the various constituents & details and emphasize the importance of this diagram. Also draw microstructure(s) of mild-steel and gray cast-iron indicating the constituents.

(b) Enlist & explain various heat-treatment processes. Also draw TTT diagram and explain its importance for certain heat treatment processes. Re-emphasize the importance of 'Tempering' and 'Case-hardening'.

(c) Explain the reason(s) for *any two* of the following disaster(s)
- (i) Breaking-of Titanic-ship after it collides with the ice-berg.
- (ii) Burning-of Kalpana-Chawala's Columbia-shuttle's re-entry into earth's atmosphere during its return journey.
- (iii) Collapse-of RCC-buildings –of theTwin-towers of World-Trade-Centre (WTC) in New-York in 2001, not-immediately but after an hour, after the impact of the two aero-planes.

Q.3 Answer any four of the following **[5 x4 = 20]**

(a) Non-ferrous metals, its properties and its applications
(b) Properties & applications of various types of Brass and Tin-Bronze
(c) Aluminum-alloys and Age-hardening of Duralumin
(d) Smart-materials, its importance, types & applications.
(e) Bio-materials and its use in various bio-applications
(f) Dental-materials

Q.4 Answer <u>any two</u> of the following **[10 x2 = 20]**

(a) Draw neat-sketch the famous 'Binding-energy per nucleon (Eb/A) versus Atomic-mass(A) 'Curve' and indicate how it leads to the possibility of both (i) nuclear-fusion and (ii) nuclear-fission.

(b) Explain nuclear-fission of Uranium and the chain-reaction. Also explain the purpose & materials of Moderator, Control-rods and the Pressurized-coolant.

(c) Draw a neat sketch of fission-based Nuclear-power-plant and explain it in-details. Also mention problems with nuclear-fission-based power-plant.

Q.5 Write brief-notes on <u>*any four*</u> of the following **[5 x4 = 20]**

(a) Why Uranium-enrichment needed
(b) Importance of Fast Breeder Reactor
(c) What is Cold-Fusion
(d) Why the Universe supposed to be Flat
(e) What necessitates need of non-baryonic attractive-gravity type Dark-matter (or alternatively need of MOND)
(f) Why there is need of repulsive-gravity type Dark-Energy