Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

III SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

END SEMESTER MAKEUP EXAMINATIONS, NOV/DEC 2016

SUBJECT: AIRCRAFT PRODUCTION TECHNIQUES [AAE 2102]

REVISED CREDIT SYSTEM

(30/12/16)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.
- Draw sketch in Pencil only

1A. Define spot welding process? How this process is carried out? Enumerate its advantages and limitations. **(03)**

1B. Explain the cutting tool principle adopted in the following operations: i) Plain turning ii) Face milling iii) Shaper iv) Planer **(02)**

1C. What is the need for mechanisms of strengthening in metals? What are the different mechanisms recommended for strengthening of metals? Explain with neat sketch solid-solution strengthening **(05)**

2A. Explain different methods of carburizing and nitriding of steel (two each) **(02)**

2B. Discuss with example how fatigue failure takes place in metals? **(03)**

2C. Classify non-traditional machining process. Explain with neat sketch laser beam machining, process parameters, advantages & disadvantages. **(05)**

3A. What is crystal imperfection? Enumerate four different types of imperfection and explain with neat sketch substitutional defect. **(03)**

3B. Define composite materials. Explain with neat sketch Hand Lay-Up method of composite fabrication. **(04)**

3C. Classify extrusion process and discuss with neat sketch hydrostatic extrusion, advantages, and limitations. **(03)**

4A. What is the principle of electric discharge machining? Enumerate four process parameters, advantages and disadvantages. **(03)**

4B. Explain powder metallurgy process. Differentiate cold isostatic compaction with hot isostatic compaction. Discuss the significance of infiltration and impregnation in the powder metallurgy process. **(05)**

4C. Explain the following process with respect to heat treatment of steel: annealing, hardening. **(02)**

5A. Classify casting process. Explain with neat sketch true centrifugal casting process, advantages, and limitations **(05)**

5B. Two pure metals A & B with melting points 900^{O}C and 400^{O}C respectively are completely soluble in their molten state. Upon solidification the binary system gives rise to a single homogeneous solid. Details of start and end of solidification of various alloys in the series are as follows: **(05)**

Alloy of composition	Temperature (^{o}C) at start of solidification	Temperature (^{o}C) at end of solidification
• 90%A-10%B	890	790
• 80%A-20%B	870	700
• 70%A-30%B	840	630
• 60%A-40%B	810	570
• 50%A-50%B	770	525
• 40%A-60%B	715	485
• 30%A-70%B	650	450
• 20%A-80%B	580	425
• 10%A-90%B	500	405

i). Assuming that there are no solid-state reactions taking place, draw the phase diagram of the series and label all the regions.

ii). Find out the number, type, composition and relative amounts of the phases present in an alloy of 60%A-40%B at 700^{O}C.