BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: PRE-PHD **SEMESTER : NA**
BRANCH: PROD. **SESSION : MO/18**

SUBJECT: PE506 MANUFACTURING TECHNOLOGY

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) With a neat sketch explain the various steps involved in 'Investment casting' with advantages and typical applications. [5]

Q.1(b) A cylindrical shaped part (fig. A) is to be cast out of Aluminum. The radius of the cylinder is r = 250mm and its height is h = 20mm. If the mold constant Cm = 2.0 sec/mm2 in Chvorinov's rule, how long will it take to solidify (Tcylinder)? If the casting is a flat plate (fig. B) whose length l= 30 cm, width w= 10 cm, and thickness h= 20 mm, it will take (T flat plate) time to solidify. Determine the ratio of Tcylinder :T flat plate. [5]

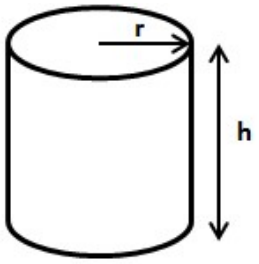

Fig.A Cylinder

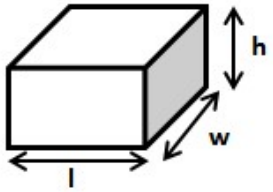

Fig.B Rectangular plate

Q.2(a) What is the difference between Engineering stress and True Stress? Obtain a relationship between Engineering and True stress & strain. [5]

Q.2(b) The thickness of a metallic sheet is reduced from an initial value of 16mm to a final value of 10mm in one single pass rolling with a pair of cylindrical rollers each of diameter of 400mm. What is the angle of bite in degrees? [5]

Q.3(a) Following is the data available on cutting speed and tool life. [5]
V_1 = 150 Mm/min; T_1 = 60 min.
V_2 = 150 Mm/min; T_2 = 60 min.
Determine the Taylor's constant and tool life exponent.

Q.3(b) Draw the Merchant Circle diagram for machining a work piece and obtain the formulas of Cutting force and Thrust force. [5]

Q.4(a) Discuss the characteristics features of friction stir welding with advantages and industrial applications. [5]

Q.4(b) What is the principle of ultrasonic welding? Differentiate between MIG and TIG welding processes. [5]

Q.5(a) How is Metal Removal Rate (MRR) calculated in Electro Chemical Machining (ECM)? Discuss the process of ECM with its advantages and applications. [5]

Q.5(b) With a neat sketch discuss the working principle and process characteristics of Electro Discharge Machining (EDM)? Discuss the advantages, limitations and typical applications of EDM. [5]

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