MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

IV SEMESTER B. TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, May/June 2018

SUBJECT: AUTOMOTIVE PRODUCTION TECHNOLOGY (AAE 2253)

REVISED CREDIT SYSTEM
(21/06/2018)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:

❖ Answer **ALL** the questions.
❖ Assume missing data suitably by clearly stating the assumption.
❖ Give sketches/graphs/examples wherever necessary.

1A Explain the functions of the following in metal casting **(05)**
(i) chaplet (ii) riser (iii) core (iv) chill (v) core print

1B In casting experiments performed using a certain alloy and type of sand mold, it took **(02)** 155 sec for a cube-shaped casting to solidify. The cube was 50 mm on a side. Determine the value of the mold constant in Chvorinov's rule.

1C With the help of a figure explain steps involved in the manufacturing of cylinder **(03)** blocks using lost form casting.

2A What are the advantages and limitations of powder metallurgy processes? **(03)**

2B Distinguish between (a) hot working (b) cold working processes. **(02)**

2C True centrifugal casting is performed horizontally to make large diameter copper tube **(03)** sections. The tubes have a length = 1 m, diameter = 0.25 m, and wall thickness = 15 mm. (a) If the rotational speed of the pipe = 700 rev/min, determine the G-factor on the molten metal. (b) Is the rotational speed sufficient to ensure successful casting?

2D The strength coefficient = 550 MPa and strain-hardening exponent = 0.22 for a certain **(02)** metal. During a forming operation, the final true strain that the metal experiences = 0.85. Determine the flow stress at this strain and the average flow stress that the metal experienced during the operation.

3A Why is flash desirable in impression die forging? **(02)**

3B A single-pass rolling operation reduces a 20 mm thick plate to 18 mm. The starting **(03)** plate is 200 mm wide. Roll radius = 250 mm and rotational speed = 12 rev/min. The work material has a strength coefficient = 600 MPa and a strain hardening exponent= 0.22. Determine (a) roll force, (b) roll torque, and (c) power required for this operation.

3C What are the measures and criteria used to assess the feasibility of a proposed cup-drawing operation? **(02)**

3D A compound die will be used to blank and punch a large washer out of 6061ST aluminum alloy sheet stock 3.50 mm thick. The outside diameter of the washer is 50 mm and the inside diameter is 15 mm. Determine (a) the punch and die sizes for the blanking operation, and (b) the punch and die sizes for the punching operation. **(03)**

4A Draw the circuit diagram used for EDM control based on RC circuit? Draw the variation of current and voltage during EDM process based on the circuit. **(03)**

4B Draw a sketch and explain the working principle of (a) ultrasonic machining (b) rotary ultrasonic machining. **(04)**

4C With the help of a sketch explain the machine components and working principle of abrasive flow machining. **(03)**

5A With the help of sketches, explain the operating principle of (a) TIG (b) MIG welding. **(03)**

5B Draw and represent the weld zone grain structure and compare the grain orientation at weld zone to that of casting ingot. **(03)**

5C With the help of a sketch, explain the principle of operation of (a) fused model deposition (b) 3-D printing (Binder Jetting) based additive manufacturing. **(04)**

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