

B.E. POWER ENGINEERING SECOND YEAR FIRST SEMESTER EXAM 2019**Subject: MATERIALS & PROCESSES****Time: 3 Hours****Full Marks: 100****Different questions of same group are to be answered together.****Gr-A**Answer any **one (1)** from the following questions.*1 x 10 = 10 Marks*

1. Draw stress-strain diagram for mild steel materials and illustrate the following points:
Proportional limit, elastic limit, upper yield point, lower yield point and ultimate tensile stress and failure point.
2. Draw an Iron-carbon equilibrium diagram.

Gr-BAnswer any **three (3)** from the following questions.

1. (a) What do you mean by a pattern in casting?
(b) Explain different types of pattern allowances. *4+10= 14 Marks*
2. (a) What is green sand and write down its composition.
(b) What should be the properties of moulding sand? *4+10= 14 Marks*
3. (a) Define welding process?
(b) Explain the following welding process.
(i) MIG welding process (ii) SAW process *4+10= 14 Marks*
4. (a) What are the welding defects?
(b) Explain the following process.
(i) Extrusion process, (ii) Forging process *4+10= 14 Marks*

Gr-CAnswer any **three (3)** from the following questions.

1. (a) Sketch of a Lathe and label it.
(b) Write down the specifications of a Lathe. *4+8= 12 Marks*
2. (a) What do you understand by 'Rake angle and Flank angle' in turning tool.
(b) Explain quick-return mechanism in shaping machine. *4+8= 12 Marks*
3. (a) What is 'tool life'?
(b) Explain the cutting force calculations from 'Merchant Circle Diagram'. *4+8= 12 Marks*

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4. Write short note on the following non-conventional process.
(a) AWJM, (b) ECM, (c) EDM

3 x 4 = 12 Marks

Gr-D

Answer any **one (1)** from the following questions.

1. The voltage-length characteristic of a direct current (DC) arc is given by

$$V=20+40l \text{ volts}$$

Where l is length of the arc in cm. The power source characteristic is approximated by a straight line with an open circuit voltage = 80 Volt, and short circuit current = 1000 Amp. Determine the optimum arc length and the corresponding arc power. *12Marks*

2. (a) During straight turning of a 25 mm diameter steel bar at 300 rpm with a HSS tool, a tool life of 10 min. was obtained. When the same bar was turned at 250 rpm, the tool life increased to 52.5 min. What will be the tool life at a speed of 250 rpm.
(b) Derive the expression for estimating machining time in shaping machine. *6+6= 12 Marks*
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