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B.Tech.
(SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
MANUFACTURING SCIENCE-I

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

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

Q.1 Attempt any two of the following:- **[10 x 2 = 20]**

(a) Describe the importance of 'Materials' and 'Manufacturing' towards 'technological' and 'socio-economic' development(s) of a Nation, citing suitable examples.

(b) Differentiate briefly (i) Production vs Manufacturing, (ii) Hot-working vs cold-working, (iii) Mises' vs Tresca's yield-criteria and (iv) sliding-friction vs sticking-friction.

(c) Derive the following formula for Forging of a rectangular-block (b x h x w) under sliding-friction condition as:

$$p/(2k) = e^{-(2\mu/h).(x - b/2)}$$

where, p is the pressure on platens at a distance x from the center, μ is the coefficient of friction between the block & the platens and k is the shear-strength of the block-material

Q.2 Attempt any two of the following:- **[10 x 2 = 20]**

(a) (i) Find the minimum roll-radius to roll down a strip of 5 mm thickness to 4 mm thickness, assume $\mu = 0.1$. Also, find how many roll passes are required to get a strip of 1 mm from a strip of 5 mm thickness with the same sets of rolls.

(ii) Find how many draws are required to draw a wire of 1 mm from a rod of 5 mm. Assume $\mu = 0.1$ and the die-angle $2\alpha = 30^{o}$.

(b) Write short notes on (i) Rolling, Rolling-Mills and rolled-products and (ii) Extrusion, types of extrusion and its applications.

(c) Briefly mention the general/common causes for defects in metal-forming process, and enlist & describe the types of defects in various metal forming processes. Also, briefly write about lubrication in metal forming operations.

Q.3 Attempt any two of the following:- **[10 x 2 = 20]**

(a) Draw a detailed neat-sketch of Die & Punch Assembly showing the details of various components (elements) of a Press-machine. Also, briefly describe the shearing action in cutting (blanking/piercing) process. Differentiate between blanking & piercing operations.

(b) Explain (i) Superiority of inclined-faced punch over flat-faced punch (ii) Compound die and Progressive die.

(c) Explain briefly any two of the following:-

(i) Tool-layout in press-work's cutting-process for scrap-minimization
(ii) Deep-drawing
(iii) Spring-back in bending

Q.4 Attempt any four of the following:- **[5 x 4 = 20]**

(a) Explosive Forming
(b) Powder-metallurgy
(c) Jigs & Fixtures
(d) Past, present & possible future uses of Plastics (polymers)
(e) Manufacturing is not only a 'wealth creator' but job-creator too, hence important for sustainable development of a Nation
(f) Bath-tub curve

Q.5 Attempt any two of the following :- **[10 x 2 = 20]**

(a) Enlist & describe (i) Desirable properties of moulding sand and (ii) Types of defects & remedies in sand casting.

(b) Derive: (i) pouring-time expressions for top-placed & side-placed runner and (ii) optimum h/d ratio for top-placed & side-placed riser, onto a mould.

(c) Write short notes on (i) Centrifugal-casting and (ii) Hot-chamber & Cold-chamber Die-casting.