(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 4081 Roll No. | | | | | | | | | | |

B.Tech.

FOURTH SEMESTER EXAMINATION, 2005-2006

MANUFACTURING SCIENCE - I

Time : 3 Hours *Total Marks : 100*

Note : *(i) Answer **ALL** questions.*
(ii) In case of numerical problems assume data wherever not provided.
(iv) Be precise in your answer.

1. Attempt *all* parts of the following : **(10x2=20)**

(a) (i) Importance of Manufacturing in India in present scenario.

(ii) Write the composition of
(1) Inconel
(2) Duralumin

(iii) Write the manufacturing process for :
(1) Tungsten carbide tool tip
(2) Seamless tubes

(iv) Write the material for -
(1) lathe bed
(2) crank shaft for i.c. engines.

(v) Write down the expanded form of -
(1) BHEL (it is an industry)
(2) NDT

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(b) Differentiate :

(i) Weldability and Machinabelity

(ii) Riser and Runner

(iii) Hot and Cold working

(iv) Conventional forming and Unconventional forming processes.

(v) Thermoplastic and Thermosetting polymers

2. Attempt *any two* parts of the following : **(8x2=16)**

(a) What are the two important yielding criteria for ductile metals, compare them and derive the basic governing equations of the yielding criteria.

(b) Explain striking friction. Show that in forging of a rectangular block of the size $b \times h \times w$ under the condition of striking friction, the pressure distribution is given by $\frac{P}{2K} = 1 - \frac{1}{h}\left(x - \frac{b}{2}\right)$

where, P = Pressure at a distance x from the centre

K = Shear yield stress of the material

h = height of the block

b = breadth in xy plane

(c) Prove that the maximum possible draft in case of strip rolling can be expressed as :

$(h_b - h_a)max = \mu^2 R$,

if the friction condition for unaided entry of the workpiece is satisfied.

Where h_p and h_a are the thickness of strip before and after rolling, respectively,

μ = Coefficient of friction between roll and strip.

R = Radius of Roll.

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3. Attempt *any two* parts of the following : **(8x2=16)**

(a) Derive the following expression for drawing stress σ_x for wire drawing

$$\frac{\sigma_x}{2K} = \frac{1+\beta}{\beta}\left[1-\left(\frac{D_a}{D_b}\right)^{2\beta}\right]$$

where $\beta = \mu\cot\alpha$

μ = Coefficient of friction

α = Semi-die angle

K = shear yield strength of wire material

D_a & D_b are the diameters of wire at exit and inlet of the die respectively.

(b) Describe common rolling and extrusion defects and their remedial measures. Give few examples of rolled and extruded products.

(c) A flat strip of the thickness 5.0mm is to be reduced to 4.0mm by rolling process. Taking $\mu = 0.10$ and considering this friction to be enough for rolling, find the roll radius.

Also ascertain

(i) The mean roll pressure -

$$(P) = \left[2K\left(1+\frac{\mu L}{h_1+h_2}\right)\right]$$

L = Roll contact length

h_1, h_2 = thickness before and after rolling.

K = Shear strength of the material

(ii) Power required for rolling, if the roll rpm is 6, roll width is 20mm and K = 200N/mm^2

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6. Attempt *any two* parts of the following : **(8x2=16)**

(a) Describe any two of the following :

(i) Pattern classification

(ii) Pattern allowances

(iii) How do patterns differ from required castings.

(b) Write short notes on any two of the following :

(i) Centrifugal casting

(ii) Casting defects

(iii) Pre-sintering

(c) Give causes and remedies of any two of the following casting defects :

(i) Blow holes

(ii) Hot tear

(iii) Rat tails.

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