SE - IV | Mech | Prodn Process - II

12.12.12

ws-Con-2012

Con. 10386–12.

KR–7325

(3 Hours) **[Total Marks : 100**

N.B. : (1) Solve any **five** questions including question number **one** which si **compulsory**.
(2) **All** questions carry **equal** marks.
(3) Use **non programmable** calculators and log table **allowed**.
(4) **Figures** to the **right** indicate **full** marks.
(5) Assume **suitable** data wherever **necessary** and mention it **clearly**.

Q 1. Attempt any four of the following: [20]
i) Explain 3-2-1 method of location in case of jigs
ii) Explain the following in connection with the measurement of surface roughness.
i) Waviness ii) Ra-Value iii) The lay iv) Sampling length
iii) Define the following term w.r.t. rolling
a) Angle of contact b) Forward slip
iv) Distinguish between gear hobbing and gear shaping
v) Steps in designing of bending dies.
vi) Prove that $Vc=V.r_c$

Q 2 A) Calculate & design a round pull type broach for machining hole of diameter 35 H7 & length 20 mm in a work-piece of carbon steel. Specific cutting Force= 4200N/mm2, IT7=0.025mm; Tooth rise= 0.03mm, Cutting speed in broaching=8m/min. [10]
Draw the broach & indicate designed values.
B] Determine & design a circular form tool graphically, to cut a semicircular groove in the cylindrical work piece whose details are given below. [10]

Maximum Radius	=60mm
Minimum radius	=40mm

Assume rake and relief angle as 10^0 & 6^0 respectively.

Q 3 A) Following data was recorded in orthogonal cutting operation m/c with carbide tipped tool. cutting speed = 120m/min Feed= 0.2mm/rev, depth of cut= 2mm, Chip thickness = 0.45mm Cutting force= 185 kgs, Feed force = 75 kgs, Rake angle= 10° [10]
Calculate the following:

1] Chip thickness ratio	2] Resultant force	3] Shear angle4]Length of shear plane
5] Frictional force	6] Friction angle	7] Normal compressive force
8] Coefficient of friction	9] Shear force	10] Shear velocity

B) Discuss any two of the following: [10]
i) Different types of rolling mills
ii) Torque and power calculation in rolling
iii) Types of jig bushes.

Q 4 A] Discuss the step of designing drill jig . [10]
B] A slab milling operation is performed under the following conditions: [10]

Cutter diameter	100mm
Number of teeth	30
Helix angle of cutting edge	15 degree
Depth of cut	7.5mm

[TURN OVER

Width if cutter	80mm
RPM of cutter	165
Table velocity	80mm/min
Size of job	150x60mm

Find –

i) Maximum uncut chip thickness & length of uncut chip.
ii)Height of feed ridges.
ii) Maximum number of cutting edges cutting simultaneously
iv) Minimum depth of cut to be employed with this cutter.
v) Cutting time if over-travel is 4% of job length.

Q 5 A) Design & sketch a blanking die for producing 40000 pieces. The part is round in shape having diameter is 50mm. The material is 2mm thick M.S. sheet, having shear strength of 430N/sq.mm & ultimate tensile strength 600N/sq.mm. Assume suitable data wherever necessary. Following factors are expected in the design of die-

i) Strip layout ii) Cutting clearance,
iii) Cutting force iv) Approximate shut height
v) Size & position of dowels & Screws:

B] Draw the necessary views of twist drill & mark all features on these views. Explain the force analysis. [10]

Q 6) A steel shaft 50mm diameter is required to be turned through distance of 300mm on an engine lathe. Depth of cut is 6mm & the rate of feed 0.2mm/rev. Two types of tools are available for this purpose: i) H.S.S ii) Tungsten Carbide. The following are the data available: [10]

Tool Material	Tool Life(minutes)	Cutting speed(meters/minute)	Tool changing time(minutes)
H.S.S.	20	40	3
	35	31	
Tungsten Carbide	15	125	3
	45	85	

HSS costs an average of Rs 30 per edge & carbide costs Rs.75 per edge. Take the operating cost as Rs 120 per hour. Analyze the selection of the tool material based on minimum cost of machining.

B] Distinguish between [10]

i) Compound and progressive die
ii) Drilling and milling fixture

Q 7 A) Write short on any four ; [20]

i) Cutting fluid.
ii) Extrusion
iii) Cutting tool materials
iv) State the requirement of dynamometer & explain any one mechanical dynamometer.
vi) ORS.