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B.TECH
PCME4304

5th Semester Regular / Back Examination 2016-17
MACHINING SCIENCE AND TECHNOLOGY
BRANCH: MECHANICAL
Time: 3 Hours
Max Marks: 70
Q.CODE: Y241
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1   **Answer the following questions:**   **(2 x 10)**

a)   Differentiate between oblique cutting and orthogonal cutting.

b)   What is flank wear? With a neat sketch show it on a cutting tool.

c)   The rake angle of the cutting tool is $15°$, shear angle $45°$ and cutting velocity 35 m/min. What is velocity of the chip along the tool face?

d)   A steel bar 200 mm in diameter is turned at a feed of 0.25mm/rev with a depth of cut of 4 mm. The rotational speed of the work piece is 160 rpm. Find out the material removal rate in mm^3/s.

e)   Write the advantages and disadvantages of climb milling.

f)   What is Chemical Machining? State it's advantages & disadvantages.

g)   A hole of 20 mm diameter is to be drilled in a steel block of 40 mm thickness. The drilling speed is 400 rpm and feed rate is 0.1mm/rev. The required approach and over run of the drill together is equal to the radius of the drill. Calculate the drilling time in minute?

h)   How the size of turret lathe is specified.

i)   Calculate the angle swiveled by the compound rest during taper turning of a specimen of diameter"D" to "d" over a length of "L".

j)   Explain the effect of resistance, capacitance and spark gap on metal removal rate (MRR) in EDM process.

Q2 a) Explain briefly principle and working of Ultrasonic machining **(6)**
(USM)process. List it's advantages, disadvantages and application.

b) Calculate the metal removal rate(in mm^3/min), when a titanium sheet **(4)**
of 5mm thickness is cut by wire EDM process using a wire of 1mm
diameter. A uniform spark gap of 0.5 mm on both side of the wire is
maintained during cutting operation. If the feed rate of the wire into the
sheet is 20 mm/min

Q3 a) With neat sketch explain Whitworth quick return mechanism. **(6)**

b) Derive an expression for optimum cutting speed for minimum cost of **(4)**
machining.

Q4 What are the different methods of indexing? Differentiate between **(10)**
simple indexing and compound indexing.

Q5 a) What is creep feed grinding? Discuss salient features, advantages and **(6)**
application.

b) Discuss about the half nut mechanism in lathe machine. **(4)**

Q6 a) What are the primary functions of a cutting fluid? **(5)**

b) An HSS tool is used for turning operation. The tool life is 1 hr. when **(5)**
the turning is carried out at 30m/min. The tool life will be reduced to
2.0 min if the cutting speed is doubled. Find the suitable speed in RPM
for turning 300 mm diameter so that life is 30 min.

Q7 Show schematically the Merrchant's force circle in orthogonal cutting. **(10)**
Derive the equations for shear and friction forces in terms of material
properties and cutting process parameters. State also the assumptions
made while arriving at final equations.

Q8 **Write short notes on any two:** **(5 x 2)**

a) Lathe tool Dynamometer

b) Center less grinding.

c) Cemented carbide tools

d) Speed reversal mechanism