

College of Engineering, Pune – 5.
(An Autonomous Institute of Government of Maharashtra)

End semester Examination
Production Processes (PE-201)

Programme: S. Y. B. Tech. (Production-Sandwich)

Duration: 180 Min.

Max. Marks: 50

Date: 12/11/2010

Year: 2010–11

Semester: Autumn

Instructions:

- Question no. 1 is **compulsory**.
- Out of remaining **six** questions (Q.2 – Q.7), attempt any **four** questions. (4*10=40 Marks)
- Figures to the right indicate full marks.
- Draw neat sketches wherever required.
- Use of non-programmable calculator is allowed.

- Q.1 a Determine the angle at which the compound rest should be swivelled when cutting a taper on a workpiece having following dimensions. 2
- 1) Total length of the workpiece = 100 mm.
 - 2) Outside diameter of the rod = 50 mm.
 - 3) Length on which taper is to be generated = 75 mm.
 - 4) Smallest diameter desired at one end of the rod is 25 mm.
- b What is resistance welding? Explain any two types and its applications. 4
- c Differentiate between up milling and down milling. 4
- Q.2 a Sketch and explain the different parts of standard double housing planer. Explain how planer machine differs from shaper machine. 5
- b Why it is essential that cutting point of tool should be in level with the spindle center while facing or tapering? 5
- Q.3 a What is grinding operation? Sketch and explain internal centerless grinding process with its applications and limitations. 5
- b Why automatic feed mechanism is required in shaper machine? With the help of neat sketch, discuss working of pawl mechanism. 5
- Q.4 a A stainless steel shaft of diameter 110 mm and length 200 mm is turned to 100 mm diameter. Estimate the time required for total operation if cutting speed is 27 m/min, depth of cut is 1 mm, longitudinal feed is 1 mm/rev, cross feed is 0.5 mm/rev. 5
- b What is principle of Thermit welding? What are its advantages? 5

- Q.5 a) Sketch any two roll configurations in used in roll mill. 2
b) Explain different sands used in sand moulding. 3
- b) What is Sweep moulding and Skeleton moulding? 5
- Q.6 a) Explain with the sketch, how radial drilling machine differs from sensitive drilling machine. 5
b) Index 87 divisions by compound indexing using Brown and Sharp index plates. 5
Plate 1 has index holes 15,16,17,18,19,20. Plate 2 has index holes: 21,23,27,29,31,33 Plate 3 has index holes: 37,39,41,43,47,49.
- Q.7 a) Write a short note on cupola furnace showing combustion zones. 5
b) Differentiate between hot and cold working of metals 5

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End Semester Examination

MT-213 Material Science and Technology

Year: S.Y. B. Tech
Academic Year: 2010-11
Duration: 3 Hours.

Branch: Production Engineering
(Sandwich)
Out of 50 Marks

Instructions to candidates:

1. Neat Diagrams must be drawn wherever necessary.
2. Figures to the right indicate full marks.

Put your roll number here, before you start.

All Questions are Compulsory

Question No.1

A. Answer the following in short

20

- I. The amount of pearlite in annealed steel is less than normalized steel, explain why? 2
- II. Center defects cannot be revealed by Dye penetrant Test, why? Enlist any two methods to detect central defects. 2
- III. Gray Cast iron has better machinability, explain why? 2
- IV. Lower the transformation temperature; finer is the pearlite, explain why? 2
- V. Bainite cannot be obtained during continuous cooling of steels, why? Explain with diagram 2
- VI. Give two **typical** applications for any three of the following 3
(i) Low Carbon Steel (ii) High Carbon Steel (iii) Cast Iron (iv) Stainless steels
- VII. Give classification of composites based on the matrix material, what are the reinforcements used for these composites. 3
- VIII. Fiber glass reinforced composites used extensively in automobile sector, why? 2
- IX. Define the following(Any Two) 2
i. Austenite ii. Cementite iii. Pearlite

Question No.2

16

- B. Draw and label the CCT Curve for Eutectoid steel. Draw different cooling rates which will result in the formation of martensite, fine pearlite, coarse pearlite and the cooling rate indicating CCR. 3+2
- C. Why is tempering necessary after hardening of steels? How it affects the properties of steel. 2+2
- D. Brief the steps involved in manufacturing of a gear with powder metallurgy Techniques.
- Write any six advantages of PM Technique. 5+2

Question No.3

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Differentiate between following **with reference to the specified points**

(Note: Don't Draw Microstructure). (Answer in Tabular format only)

(i) Gray Cast Iron and White Cast Iron

Composition Range, Hardness & Wear Resistance, Microstructural Features & Cooling Rate,
Damping Capacity, Weldability. 5

(iii) Alloy Steels and Plane Carbon Steel

Hardness at elevated Temperatures, Hardenability-CCR, Strength, Corrosion Resistance 3

(iv) Induction Hardening and Case Carburizing

Process & Heat Source, Microstructural Feature & Phases, Amount of Carbon, Typical Applications 4

(v) Thermosetting and Thermoplastic resins.

Definiton, Properties, Examples. 2

College of Engineering, Pune
End Semester Exam. – Dec. – 2010
S.Y. B. Tech.
(ME – 209) (Theory of Machines)

Day & Date :- 09-Nov.-2010

Duration:- 3 hrs.

Instructions:

- 1) Figures to the right indicate full marks
- 2) Use of non programmable calculator is allowed
- 3) Assume suitable data, if necessary.

Q.1: Solve any Two –

- a) What do you understand by inversion of a kinematic chain? Explain with help of neat sketches inversion of single slider crank chain giving their practical application. [5]
- b) Derive Kutzbach criterion for motion in plane & hence deduce Grubler's equation. [5]
- c) Derive the condition for exact steering and prove that it is satisfied in Davi's steering gear. [5]

Q.2:

- a) In an I.C. engine mechanism the crank is 50mm long & the connecting rod is 200mm long. The crank makes angle of 45° with the inner dead center. Locate all the possible instantaneous center of rotation for this. If the crank rotating with 1400rpm in anticlockwise direction, find out the velocity of piston and angular velocity of connecting rod. [5]
- b) In a slider crank mechanism the crank is 50mm long and the connecting rod 200mm long. When crank has moved through 30° from inner dead center position the velocity of slider is 2m/sec. Find using kien's construction angular acceleration of connecting and acceleration at center of gravity of C.R., which is situated at a distance of 80mm from big end. [5]

Q.3: Solve any Two –

- a) A function varies from 0 to 10. Find the Chebychev spacing for six precision points. [5]
- b) Derive the Freudenstein's equation for four bar mechanism. [5]
- c) A shaft fitted with a flywheel rotates at 250 rpm and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000 N-m uniformly during $\frac{1}{2}$ revolution and remains constant for the following revolution. It then falls uniformly to 750N-m during the next $\frac{1}{2}$ revolution and remains constant for one revolution, the cycle being repeated thereafter.

Determine the power required to drive the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg with radius of gyration of 600mm. [5]

Q.4:

a) A load of 10KN is raised by means of screw jack, having square thread screw of 12mm pitch and of mean diameter 50mm. If a force of 100N is applied at end of lever to rise the load, what should be the length of lever used? Take coefficient of friction 0.15. What is the mechanical advantage obtained? State whether the screw is self-locking. [5]

b) The thrust of propeller shaft in a marine engine is taken up by number of collars integral with the shaft, which is 300mm in dia. The thrust on the shaft is 200KN & speed is 75rpm. Taking coefficient of friction constant equal to 0.05 and the assuming the intensity of pressure as uniform and equal to 0.3 N/mm². Find the external diameter of collar and the no of collars required. If the power lost in friction is not exceed 16KW. [5]

Q.5:

a) The belt drive consists of two V-belt in parallel on a grooved pulley of same size. The angle of groove is 30°. The cross-sectional area of each belt is 750mm² & $\mu=0.12$. The density of belt material is 1200 kg/m³ and the maximum safe stress in a material is 7 Mpa. Calculate the power that can be transmitted between pulleys 300mm diameter rotating at 1500rpm. Find also shaft speed in rpm, at which the power transmitted would be maximum. [5]

b) A chain drive is used for reduction of speed from 240rpm to 120rpm. The no of teeth on the driving sprocket is 20. Find the no of teeth on the driven sprocket. If the pitch circle diameter of driven sprocket is 600mm and center-to-center distance between two sprockets is 800mm, determine pitch & length of chain. [5]

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College of Engineering, Pune
End Semester Exam – May 2010
S . Y. B. Tech. (Production Engineering)

ME 211 Design of Machine Elements

Day & Date : Friday, 7th May 2010

Time : 2 pm to 5 pm

Maximum Marks: 50

Instructions:

1. Use of Design Data Book allowed.
2. Use of Non programmable calculators allowed.
3. Assume missing data, if any, suitably and clearly mention the same.
4. Mobile phones are not allowed inside the exam hall.
5. Marking scheme is indicated at the right hand side of each question.

Q.1. A. Mention two ferrous, two non ferrous and one non-metal materials and one application of each of these in real machine components. (5)

B. A bearing and shaft of nominal diameter 100 mm have tolerances specified as follows: (5)

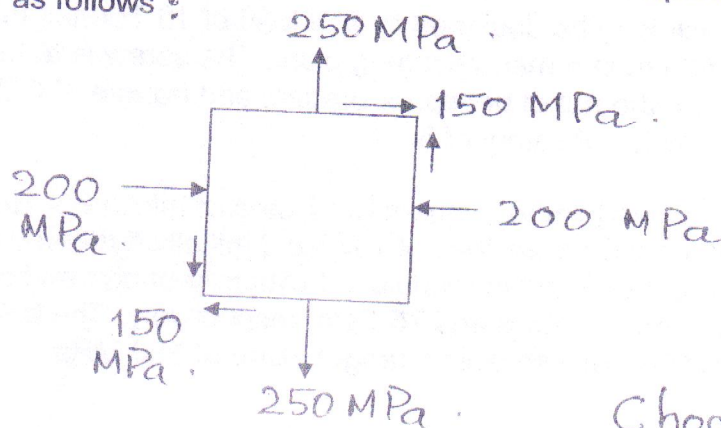
Bearing : + 0.000 and + 0.020

Shaft : + 0.025 and + 0.050

What is the nature of fit produced?

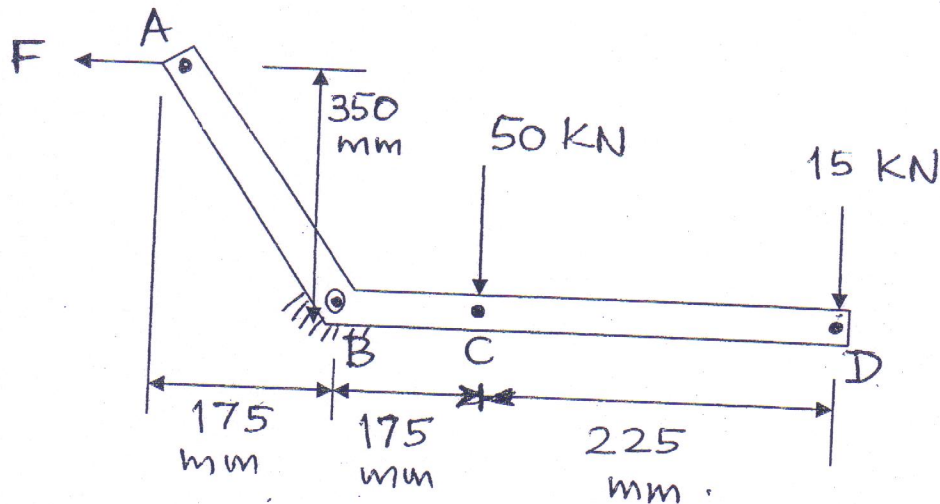
What are the max / min interference / clearance ?

Q. 2 A. A biaxial state of stress at a point in a machine component is found to be as follows :



Choose suitable material for the component.

- B. A lever ABCD shown in figure is subjected to loads as shown. Determine F and the dimensions of the pin at B if the pin is made of steel having bearing strength of 300 MPa, tensile strength of 400 MPa and shear strength of 250 MPa. Assume a factor of safety of 2. (5)



- Q. 3 A. Design a cotter joint to connect two rods of circular cross sections. The joint is subjected to a load of 50 kN. The strength of the material of cotter joint can be taken as 140 MPa in tension, 70 MPa in shear and 210 MPa in compression. Assume a factor of safety of 2. (5)
- B. An electric generator is to be coupled to a gas turbine producing 2 MW of power at 12000 rpm. Design the shaft and a coupling. Choose any material of your choice for the shaft and coupling. (5)
- Q. 4 A. A screw jack is to be designed to lift a load of 10 Tonnes through a height of 50 cm in a manufacturing plant. The screw is to be made of C30 steel, the nut of phosphor bronze, and handle of C30 steel. Assume a factor of safety of 5. (5)
- B. Design a bolted joint to connect two plates of thickness 10 mm subjected to an external load of 7 kN and initially tightened to a load of 6 kN. Assume the modulus of elasticity of bolt and plate materials to be 210 GPa and 75 GPa, respectively. The bolt is made of C45 steel with yield strength value of 380 MPa. (5)

- Q. 5 Design a compression helical spring for disengaging a clutch plate used in a transmission system of an automobile producing 80 kW at 1200 rpm. The clutch plate has friction disks with inner and outer diameter of friction surfaces being 200 mm and 300 mm respectively. Coefficient of friction is 0.20. (10)

