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S.E. (Mech.) (Second Semester) EXAMINATION, 2008

TOM AND M—I

(2003 COURSE)

Time : Four Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

Unit I

1. (*a*) Sketch and explain with suitable example : [4]

(*i*) Rolling pair;

(*ii*) Globular pair.

(*b*) What is an inversion of a kinematic chain ? Explain any *two* inversions of single slider-crank chain with practical applications. [6]

(*c*) Explain the elliptical trammel with neat sketch. State and explain the condition of tracing circle using elliptical trammel. [6]

Or

2. (*a*) Differentiate between machine, mechanism and structure. [4]

(*b*) Explain concept of equivalent linkage of mechanism with suitable example.

How is this concept applied to the mechanisms with lower pairs ? [6]

(*c*) In a crank and slotted lever quick return motion mechanism, the distance between the fixed centres is 240 mm and the length of the driving crank is 120 mm. Find the inclination of the slotted bar with the vertical in the extreme position and the time ratio of cutting stroke to the return stroke. If the length of the slotted bar is 450 mm, find the length of the stroke if the line of stroke passes through the extreme positions of the free end of the lever. [4]

Unit II

3. (*a*) Write the equation of velocity ratio in between driving and driven shafts of a Hooke's joint. State and explain the condition for : [8]

(*i*) Maximum velocity ratio

(*ii*) Minimum velocity ratio

(*iii*) Equal speeds.

(*b*) Write short notes on : [8]

(*i*) Harts mechanism;

(*ii*) Pentograph.

Or

4. (*a*) Explain the condition for correct steering. [6]

(*b*) Explain with neat sketch, Ackermann steering gear mechanism. What are the limitations of the same ? [6]

(*c*) State disadvantages of Davis steering gear mechanism. In case of Davis steering gear mechanism : [4]

(*i*) The distance between the pivots of the front axle = 1.5 m.

(*ii*) The wheel base = 5 m.

Find the inclination of the track arms to the longitudinal axis, provided that the mechanism has to satisfy the condition of correct steering.

Unit III

5. (*a*) State and explain "Three centres in line" theorem and angular velocity ratio theorem. [6]

(*b*) Fig. 1 shows a mechanism for a wrapping machine, in which pins O_1, O_2 and O_3 are fixed. The crank O_1P is a driving crank rotating at uniform speed of 50 rad/s. The dimensions of the mechanism are : [12]

O_1P = 80 mm, PR = 650 mm, QR = 200 mm, O_3R = 180 mm, O_2T = 350 mm, O_2S = 175 mm and QS = 125 mm.

Find the velocity of the point T on the Bell-Crank lever by ICR method.

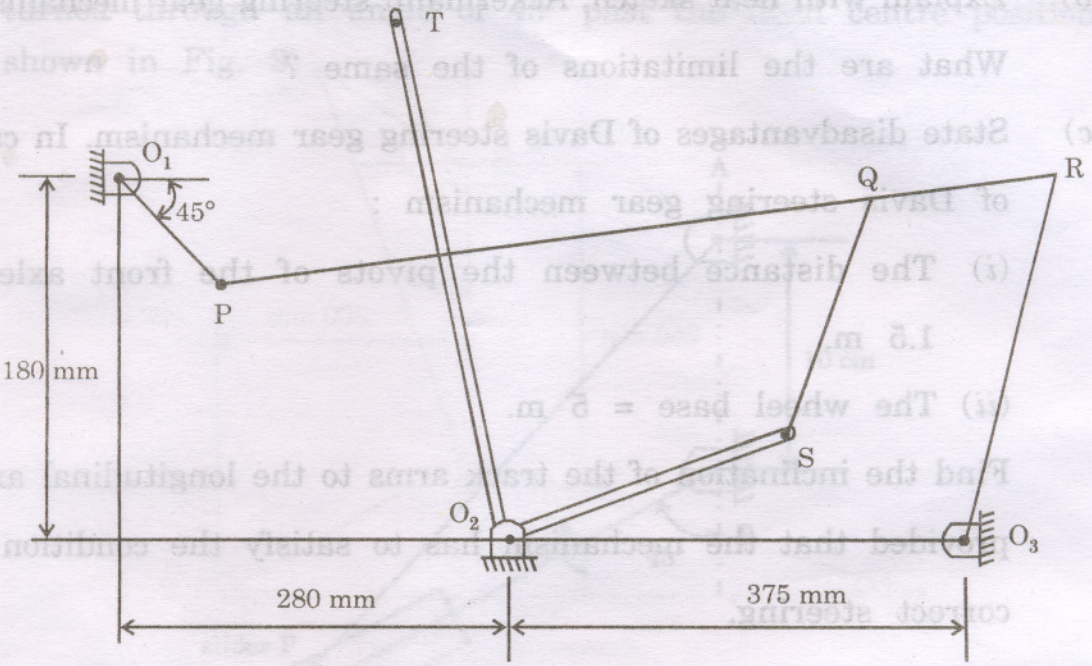

Fig. 1

Or

6. (*a*) Explain the velocity image principle. Explain the method of determining the rubbing velocity at a pin joint. [6]

(*b*) Fig. 2 shows a toggle mechanism. The length of links are : [12]

OA = 100 mm, AB = 250 mm, BC = 300 mm, BD = 350 mm

The crank OA rotates at a speed of 180 rpm in clockwise direction. Draw velocity diagram using velocity image principle.

Determine :

(*i*) Velocity of slider D

(*ii*) Angular velocity of link BD.

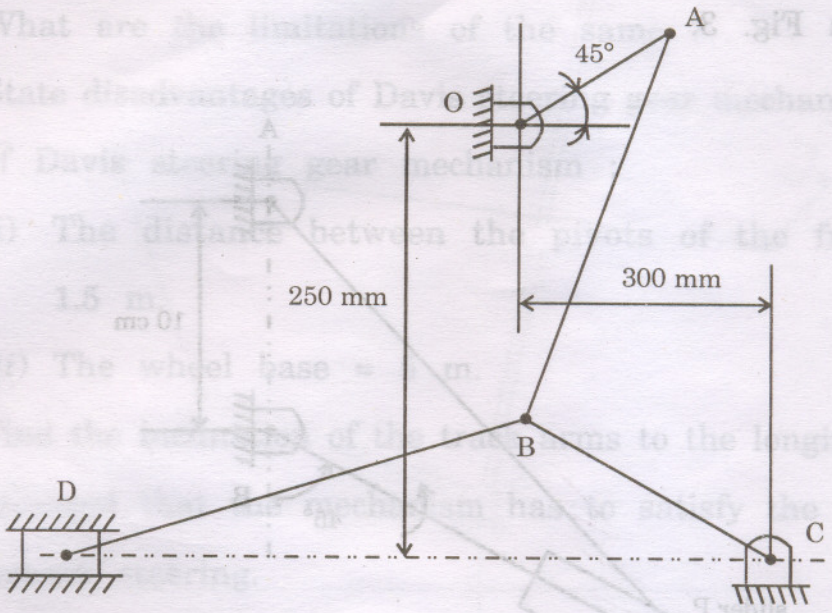

Fig. 2

SECTION II

Unit IV

7. (*a*) Explain Klein's construction for determining the acceleration of piston of a reciprocating engine. Also give the proof of the construction. [8]

(*b*) Derive Euler-Savary Equation. [8]

Or

8. The cylinder of rotary engine rotated at uniform speed of 900 rpm clockwise about the lower end B of a fixed vertical crank

AB 10 cm long. The connecting rod AP 40 cm rotates about the upper end. The Piston P reciprocates in cylinder. Determine the angular acceleration of the connecting rod for a cylinder which has turned through an angle of 45° past the dead centre position as shown in Fig. 3.

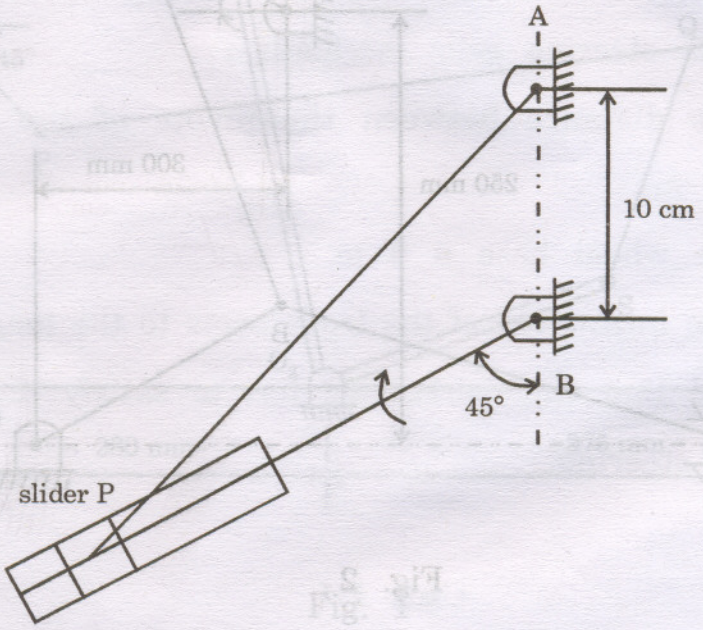

Fig. 3

Unit V

9. (*a*) A mass of 10 kg is raised by a rope ground around a drum of diameter 300 mm. The drum has mass moment of inertia of 0.01 kg-m^2 and mass moment of inertia of motor is 0.05 kg-m^2. The speed conduction between motor and drum is 10 : 1. What torque must be exerted by the motor in order to move the mass upwards at an acceleration of 2m/s^2. Sketch the arrangement. [8]

(*b*) Explain analytical method for inertia forces in IC engine mechanism. [8]

Or

10. (*a*) Explain the graphical method of inertia force (Dynamic force) analysis of a horizontal reciprocating engine mechanism by drawing neat sketches. Discuss the various steps clearly. [10]

(*b*) Explain the Trifilar suspension system. [6]

Unit VI

11. (*a*) Explain the graphical procedure of three-position synthesis for four bar mechanism. [6]

(*b*) Explain overlay method for locating precision position in four bar respectively. [6]

(*c*) Explain the terms : [6]

(*i*) Precision positions

(*ii*) Structural error.

Or

12. (*a*) A four bar mechanism is used to generate the function $y = 1/x$ for the range $1 \leq x \leq 3$. Find the three precision position from Chebyshev spacing, if the initial values of the crank angle and follower angle is 30° and 200° respectively. Take $\Delta\theta = \Delta\phi = 90°$. Find the corresponding values of θ and ϕ. [12]

(*b*) Explain the following terms related to synthesis problem : [6]

(*i*) Function generation;

(*ii*) Path generation.

Total No. of Questions—12] [Total No. of Printed Pages—4+1

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S.E. (Mechanical) (Second Semester) EXAMINATION, 2008

IC ENGINES AND AUTOMOBILE ENGINEERING

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

Unit I

1. (*a*) What are the basic components of an I.C. engine ? Explain their functions. [8]

(*b*) Explain the use of air standard cycle analysis for study of I.C. engines. [4]

(*c*) What are the assumptions made in the analysis of fuel-air cycle ? [4]

Or

2. (*a*) Explain the importance of fuel-air cycle and how far it is useful in predicting the performance of actual engines. [8]

P.T.O.

(*b*) The ideal Otto engine working on the air standard has a temperature and pressure at the beginning of 25°C and 1 bar respectively, and a thermal efficiency 48%. Determine the pressure and temperature at the end of compression. [4]

(*c*) Explain burning time loss with the help of a P-V diagram. [4]

Unit II

3. (*a*) Explain working of a solex carburettor with a neat sketch. [8]

(*b*) What are the basic elements of C.I. engine fuel injection system ? Explain their functions with a schematic diagram. [8]

Or

4. (*a*) Explain working of a fuel feed pump with a neat sketch. [8]

(*b*) Write a short note on MPFI system for modern automobile engines. [8]

Unit III

5. (*a*) What are the types of conventional ignition systems ? Explain the working of a magnetoignition system with the help of neat sketch. [9]

(*b*) What are the requirements of a good governor ? With the help of a neat sketch, explain hit and miss type of governing system. [9]

Or

6. (*a*) What are the properties of good lubricants ? With the help of neat sketch, explain dry sump system. [8]

(*b*) Why is cooling of I.C. engine essential ? Explain working of Thermo-syphon cooling system with neat sketch. [7]

(*c*) Differentiate between evaporative cooling and forced circulation cooling. [3]

SECTION II

Unit IV

7. (*a*) During a trial on a four-stroke petrol engine, air consumption is measured by means of a circular orifice of diameter 3.5 cm. The co-efficient of discharge for the orifice is 0.6 and the pressure across the orifice is 14 cm of water. The barometer reads 76 cm of Hg. Temperature of air in the room is 24°C. The piston displacement volume is 1800 cm^3. The compression ratio is 6.5 The fuel consumption is 0.13 kg/min of calorific value 44000 kJ/kg. The brake power developed at 2500 rpm is 28 kW.

Determine :

(*i*) Air-fuel ratio.

(*ii*) The volumetric efficiency on the basis of air alone.

(*iii*) The brake mean effective pressure.

(*iv*) The relative efficiency on the brake thermal efficiency basis. [8]

(*b*) How the I.C. engine performance characteristics used for engine performance evaluation ? [5]

(*c*) What are the advantages and limitations of supercharging ? [5]

Or

8. (*a*) During a test on a single cylinder low speed four-stroke cycle oil engine having a bore of 30 cm and stroke of 45 cm, the following observations were taken :

Ambient air temperature	: 20°C
Duration of trial	: 1 hour
Total fuel consumption	: 11.4 kg/hr
Calorific value of fuel	: 42000 kJ/kg
r.p.m.	: 300
Brake mean effective pressure	: 6 bar
Net brake load	: 1.5 kN
Brake drum diameter	: 1.8 m
Brake rope diameter	: 2 cm
Quantity of jacket cooling water	: 660 kg/hr.
Temperature of entering cooling water	: 20°C
Temperature of leaving cooling water	: 75°C
Quantity of air as measured	: 250 kg/hr
Specific heat of exhaust gases	: 1 kJ/kgK
Exhaust gas temperature	: 420°C

Determine :

(*i*) indicated power;

(*ii*) brake power;

(*iii*) mechanical efficiency;

(*iv*) indicated thermal efficiency

(*v*) Draw up a heat balance on hour basis. [9]

(*b*) What are the methods of turbo-charging ? Explain any *one* method with neat sketch. [5]

(*c*) What are the advantages and limitations of turbo-charging ? [4]

Unit V

9. (*a*) Explain with a diagram the stages of combustion in C.I. engines. [8]

(*b*) Explain the phenomena of detonation in SI engine. What are the main factors which affect detonation ? [8]

Or

10. (*a*) What is Diesel knock ? On what factors does it depend ? [4]

(*b*) What are the types of combustion chambers used for C.I. engines ? [4]

(*c*) Explain with the help of neat diagram the combustion phenomenon is SI engines. [8]

Unit VI

11. (*a*) What are the major pollutants found in the C.I. engine emissions ? [8]

(*b*) Explain with the help of a neat sketch the working of a catalytic converter. [8]

Or

12. (*a*) What are the various requirements of engine for the automotive applications ? [8]

(*b*) Write short notes on : [8]

(*i*) Hybrid vehicles;

(*ii*) PUC norms.

Total No. of Questions—12] [Total No. of Printed Pages—4+2

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S.E. (Mech./Sand.) (Second Semester) EXAMINATION, 2008

ELECTRICAL TECHNOLOGY

(Common to Mech. S/W Indus., Prod., Prod. S/W)

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer any *three* questions from each Section.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of electronic pocket calculator is allowed.

(*vi*) Assume suitable data, if necessary.

SECTION I

1. (*a*) Draw a neat sketch of four pole d.c. machine. Mark main parts on it. State the function of any *four* parts and material used for its construction. [9]

(*b*) A 120 V d.c. shunt motor draws a current of 200 A. The armature resistance is 0.02 Ω and shunt field resistance 30 Ω. Find the back e.m.f. and speed at which motor will run, if the lap wound armature has 90 slots with four conductors per slot and flux per pole is 0.04 Wb. [9]

P.T.O.

Or

2. (*a*) With suitable circuit diagram and graph, explain :

(1) armature voltage control

(2) flux control methods of speed control of d.c. shunt motor. [9]

(*b*) Draw and explain electrical and mechanical characteristics of :

(*i*) Shunt

(*ii*) Series

(*iii*) Compound

d.c. motor. Also state two applications of each motor. [9]

3. (*a*) Explain with the help of circuit diagram and phasor diagram, how single-phase wattmeter is used to measure three-phase reactive power of a balance load. [6]

(*b*) State and explain basic requirements of a good lighting scheme. [4]

(*c*) Two-wattmeter method is used for measurement of input power of a three-phase induction motor. If two-wattmeter readings are 1700 watt and 1100 watt; determine :

(*i*) Input power to the motor

(*ii*) Power factor of the motor

(*iii*) Input current drawn from 440 V, 3 ϕ, A.C. supply. [6]

Or

4. (*a*) Write a short note on "Flood Lighting". [6]

(*b*) State and explain any *one* method of power factor improvement used in the practice. [4]

(*c*) Explain step by step the procedure used to design a simple indoor lighting scheme for drawing hall. [6]

5. (*a*) With simple diagrams explain salient and non-salient rotor construction of alternator. [6]

(*b*) Write a short note on welding transformer. [4]

(*c*) A three-phase, 12 pole alternator has full pitch winding with 108 armature slots and 12 conductors per slot. The flux per pole is 50 mWb and sine distributed. If speed of rotation is 500 rpm, find frequency and phase e.m.f. generated. [6]

Or

6. (*a*) What is current and potential transformer ? State their uses. [6]

(*b*) Write only the formula of e.m.f. generated per phase of a alternator and explain various terms involved in it. [4]

(c) A 5 kVA, 400 V/200 V, 50 Hz, single-phase transformer gave the following results during OC and SC tests :

(a) No-load : 400 V, 1 A, 60 W (primary side)

(b) Short-circuit : 15 V, 12.5 A, 50 W (primary side).

Calculate :

(i) Equivalent resistance and reactance referred to primary side.

(ii) Regulation at full load and 0.8 (lag) power factor. [6]

SECTION II

7. (a) State and explain construction of rotor, advantages, disadvantages and applications of squirrel cage and slipring induction motors used in practice. [9]

(b) A 6 pole, 50 Hz, 500 V, three-phase induction motor running on full load with 4% slip develops 14.92 kW. If the friction and windage losses are 200 W and stator losses are 1620 W, determine :

(i) rotor speed at full load,

(ii) frequency of rotor e.m.f. induced,

(iii) rotor copper loss,

(iv) stator input power,

(v) efficiency of the load,

(vi) line current drawn at full load if pf of load at full load is 0.86 (lag). [9]

Or

8. (*a*) Derive the expression for torque developed in the induction motor. Draw the torque-slip characteristic. Also indicate on it, effect of addition of rotor resistance. Hence obtain condition at which maximum torque occurs. [9]

(*b*) The power input to the rotor of a 400 V, 50 Hz, 6 pole, three-phase induction motor is 75 kW. Motor has 2 kW stator losses and mechanical losses 750 watts. If frequency of e.m.f. induced in the rotor circuit has 4 Hz, determine :

(*i*) slip of the motor

(*ii*) rotor speed

(*iii*) rotor copper loss per phase

(*iv*) O/p of the motor

(*v*) I/p of the motor

(*vi*) efficiency of motor. [9]

9. (*a*) Write a short note on 'split phase technique used in single phase motor'. [8]

(*b*) Explain with neat diagram construction, characteristics, advantages, disadvantages and applications of universal motor. [8]

Or

10. (*a*) Write a short note on 'shaded pole type single phase motor'. [8]

(*b*) Explain with neat circuit diagrams difference between a.c. and d.c. servomotors. [8]

11. (*a*) Write a short note on "Maintenance of electrical equipment such as motors and transformers". [8]

(*b*) Explain process, advantages, disadvantages, applications and operation in connection with Dielectric-Heating Method. [8]

Or

12. (*a*) Explain in detail, how length and diameter of resistive heating element used in ovens are designed in practice. [8]

(*b*) Explain in detail various selection criterion used while selection of motor for particular application. [8]

Total No. of Questions—12] [Total No. of Printed Pages—4+1

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S.E. (Mechanical) (Second Sem.) EXAMINATION, 2008

METALLURGY

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6** from Section I.

(*ii*) Answer Q. No. **7** *or* Q. No. **8**, Q. No. **9** *or* Q. No. **10**, Q. No. **11** *or* Q. No. **12** from Section II.

(*iii*) Answers to the two sections should be written in separate answer-books.

(*iv*) Neat diagrams must be drawn wherever necessary.

(*v*) Figures to the right indicate full marks.

(*vi*) Assume suitable data, if necessary.

SECTION I

Unit I

1. (*a*) Discuss different modes of plastic deformation with the help of neat sketches. [6]

(*b*) Represent the following planes and directions in the cubic system : [6]

(1) (2 1 2)

(2) (1 0 1)

(3) (0 $\bar{1}$ 0)

P.T.O.

(4) [1 1 1]

(5) [1 1 0]

(6) [2 1 0]

(c) What are dislocations ? What are the types of dislocations ? Explain about their role in plastic deformation. [6]

Or

2. (a) Derive an expression for critical resolved shear stress in single crystal. How is plastic deformation in a polycrystalline material different from deformation in a single crystal ? [6]

(b) Explain the structural and property changes during recovery, recrystallization and grain growth stages of annealing. [6]

(c) Compare Hot working and Cold working. [6]

Unit II

3. (a) Compare between : [6]

(1) Brinell and Vicker's Hardness Test

(2) Charpy and Izod Impact Test

(b) What is fatigue ? Explain how fatigue properties of material can be improved ? Define Endurance limit and Fatigue strength. [6]

(c) Explain Radiography and Magnaflux non-destructive techniques. [4]

Or

4. (a) What is creep ? How is creep test conducted ? What is the significance of equicohesive temperature ? [6]

(b) Explain with the help of neat sketches about ultrasonic and eddy current techniques. [6]

(c) What is proof stress ? How is it evaluated ? Explain its significance to mechanical engineer. [4]

Unit III

5. Write short notes on the following (any *four*) : [16]

(1) Stainless steels

(2) Classification of steels

(3) Heat treatment of 18-4-1 steel

(4) Widman statten structure

(5) High strength low alloy (HSLA) steels

(6) Effect of alloying elements on steel

(7) Specifications of steels

Or

6. (*a*) Draw Fe-Fe_3C diagram showing all the details along with classification of steels. Write all the reactions of this system. Explain about various phases and the temperatures A_1, A_3 and A_{cm}. [12]

(*b*) Explain the reasons for Widmanstatten structure. Is it desi-rable ? Justify your answer. [4]

SECTION II

Unit IV

7. (*a*) Explain about transformation products of Austenite. [6]

(*b*) What is the difference in the heat treatment schedule for Martempering and Austempering ? Also comment about micro-structure and properties of the product. [6]

(c) What is hardenability ? Explain any *one* method of evaluating it. Discuss the factors influencing hardenability. [6]

Or

8. (a) Explain the step-by-step method of plotting T-T-T curve for 0.8% carbon steel. [6]

(b) In what way is the nitriding process different from other case hardening processes ? Explain. [6]

(c) Explain about induction and flame hardening processes with the help of neat sketches. How are they different from other case hardening processes ? [6]

Unit V

9. (a) Explain the difference in the manufacturing method for production of pearlitic malleable and ferritic malleable cast iron. [6]

(b) Enlist non-ferrous bearing materials. Why are they widely used as bearing materials ? Explain about any *one* of non-ferrous bearing materials in brief. [6]

(c) Compare the micro-structures and properties of steel and cast irons. [4]

Or

10. (a) Give composition and uses of the following (any *four*) : [8]

(1) Y-alloy

(2) Elinvar

(3) Babbits

(4) Naval brass

(5) Admiralty brass

(6) Invar

(*b*) How is S.G. iron produced ? Compare its properties with other cast irons. [4]

(*c*) Explain the effect of cooling on micro-structure and properties of gray cast iron. [4]

Unit VI

11. (*a*) Enlist the powder production and testing techniques for powder metallurgy. Explain any *one* technique of each in brief. [6]

(*b*) Explain with the help of neat figure, principle, working and calibration of thermo-electric pyrometer. [6]

(*c*) Explain step-by-step manufacturing process for cemented carbide tools. [4]

Or

12. Write short notes on (any *four*) : [16]

(1) Steps in sintering

(2) Optical pyrometer

(3) Powder compaction

(4) Advantages and limitations of powder metallurgy

(5) Resistance pyrometer

(6) Seger cones and Tempil pellets

Total No. of Questions—**12**] [Total No. of Printed Pages—**4+1**

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S.E. (Mechanical) (Second Semester) EXAMINATION, 2008

MANUFACTURING PROCESSES–II

(2003 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate-answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Assume suitable data, if necessary.

SECTION I

1. (*a*) The following equation for tool life is given in turning operation :

$$VT^{0.13} f^{0.77} d^{0.37} = C$$

A 60 minute tool life was obtained while cutting at V = 30 m/min, f = 0.3 mm/rev and d = 2.5 mm. Determine the change in tool life if the cutting speed, feed and depth of cut are increased by 20% individually and also taken together. [8]

(*b*) Draw the single point cutting tool geometry and explain the importance of side cutting-edge and end cutting edge angles. [8]

P.T.O.

Or

2. (*a*) During machining of C-25 steel with 0-10-6-6-8-90-1 (ORS) shaped tripple carbide cutting tool, the following observations have been made :

Depth of cut = 2 mm, Feed = 0.2 mm/rev, speed = 200 m/min, tangential force = 1600 N; feed thrust force = 850 N; chip thickness = 0.39 mm. Calculate :

(*i*) Shear force

(*ii*) Normal force at shear plane

(*iii*) Friction force

(*iv*) Kinetic co-efficient of friction. [8]

(*b*) Draw merchant's circle of forces. [3]

(*c*) What are the types of chips ? Explain its characteristics and effect in machining. [5]

3. (*a*) Explain geometry of Broach with neat sketch. [6]

(*b*) Explain gear shaving with sketch of gear shaving cutter. [4]

(*c*) Explain thread rolling process with neat sketches. [6]

Or

4. (*a*) Explain the principle of gear shaping process with neat sketch, advantages, limitations and applications. [8]

(*b*) Explain thread milling process with neat sketches. [8]

5. (*a*) Write a short note on machining centre with block diagram. [6]

(*b*) Differentiate between CNC and DNC. [4]

(*c*) Differentiate between open loop and closed loop system. [4]

(*d*) Write the functions of the following codes :

(1) G 84

(2) G 03

(3) M 06

(4) M 23 [4]

Or

6. (*a*) Explain the following codes :

(*i*) G 81

(*ii*) G 88

(*iii*) G 17

(*iv*) M 09

(*v*) M 23

(*vi*) M 30. [6]

(*b*) Explain with neat sketch NC motion control system. [6]

(*c*) What is meant by FMS ? How is it different from CNC ? [6]

SECTION II

7. (*a*) Explain why EBM process is performed usually in vacuum chamber. [4]

(*b*) What are common requirements of tool material for EDM ? Name the common tool material. [4]

(*c*) Compare similarities and differences between ECM and EDM. [4]

(*d*) List the advantages and limitations of chemical milling. [4]

Or

8. (*a*) Draw a self-explanatory diagram of AJM. [4]

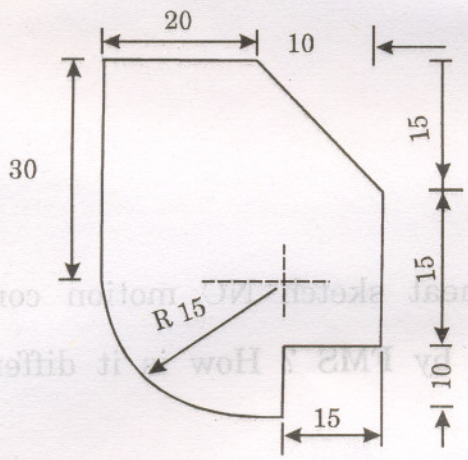
(*b*) Explain the principle of laser beam machining with neat sketches. [6]

(*c*) Explain plasma arc machining process with neat sketches. [6]

9. (*a*) Differentiate between fixed stripper and spring loaded stripper. [4]

(*b*) Explain the various methods of reducing shear forces. [6]

(*c*)



Material → Cu-sheet

Thickness – 2 mm

σ_s = 280 N/mm^2

Design : [8]

(*i*) blanking die

(*ii*) blanking punch

(*iii*) press tonnage

(*iv*) strip layout for simple blanking die.

Or

10. (*a*) Determine centre of pressure for the component as shown in Fig. 1. [6]

(*b*) Differentiate between direct and indirect pilots. [4]

(*c*) Define the following terms :

(1) Nibbling

(2) Lancing

(3) Shut height of press

(4) Die set. [4]

(*d*) Write a short note on progressive die. [4]

11. (*a*) What are the principles of clamping ? [6]

(*b*) Draw the neat sketch of renewable bushes and screw bushes. Also differentiate with reference to its function and applications. [6]

(*c*) List the various types of locating pins with its application. [4]

Or

12. (*a*) Explain the principle of location with neat sketches. [6]

(*b*) Explain design principles for location purposes. [6]

(*c*) Explain Bridge clamp and Heel clamp with neat sketches. [4]