

Code: 9A03601

III B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2013

INDUSTRIAL MANAGEMENT

(Common to ME & MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 What is the concept of motivation? How does it affect behaviour?
- 2 What do you understand by line and staff organization? With the help of a neat diagram explain the working of it.
- 3 Write down the stepwise procedure of plant layout.
- 4 (a) What is method study? Write down its objectives clearly.
(b) Describe various stages of method study.
- 5 Discuss purchase procedure highlighting inventory control records.
- 6 Define the term direct cost and indirect cost as applicable to cost of a project.
- 7 Discuss the statement "Higher quality of design means higher costs, quite often it also means higher values."
- 8 (a) What is induction? What is the purpose of induction?
(b) What is the difference between training and development? Explain.

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- 1 Explain fully the concept of hierarchy of human needs.
- 2 Explain the principles of functional organization by chart. Discuss its merits and demerits.
- 3 Discuss what you consider to be a good practice in the layout of shops and equipments for different classes of engineering works.
- 4 (a) Define work study and explain the need of it in an enterprise.
(b) What are the objectives of work study? Describe briefly.
- 5 What are the assumptions and basic components of the inventory system? Discuss the significance of each component with the help of a diagram.
- 6 A construction company has received a contract to build an office complex. It has frequently engaged itself in constructing such buildings. Which of the two network techniques, PERT and CPM, should in your opinion, be employed by the company. Why?
- 7 Define 'Quality'. Explain the factors that influence the quality of a product.
- 8 What are the best methods of recruitment for positions below supervisory level?

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Answer any FIVE questions
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- 1 Critically examine Herberg's theory of motivation. Make a comparison between theories of Herberg and Maslow.
- 2 Explain briefly the "Line Organization" with neat sketch. Why it is also called Military type organization?
- 3 What are the important factors that influence the selection of plant location? Illustrate your answer with regard to the location of a power plant in India.
- 4 How will you proceed to train workers in the proposed method?
- 5 List the various models of inventory management. Explain any two of them in detail.
- 6 (a) What kinds of decision-making situations may be analyzed using PERT and CPM techniques?
(b) State the major similarities between PERT and CPM.
- 7 What is the meaning of quality? What is the meaning of control? How is the control on quality maintained in an industrial organization?
- 8 Personnel management involves two categories of functions: "Managerial and Operative". Describe these functions in detail.

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All questions carry equal marks

- 1 Discuss the major assumptions of theory X and theory Y. How does management under theory X differ from theory Y?
- 2 State and explain the principles of organization.
- 3 Make an outline of the different factors to be taken into account in the preliminary estimation of the total floor area needed for the layout of a factory for a manufacturing concern.
- 4 Explain the importance of standardization of method before taking time study.
- 5 What do you understand by economic order quantity (EOQ)? Derive a formula to determine it.
- 6 What is the role of PERT in materials management?
- 7 Define acceptance sampling. What are the methods of acceptance sampling? Explain.
- 8 Explain the functions of a HR manager in a knowledge based organization such as software developing company.

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B.Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

CAD/CAM

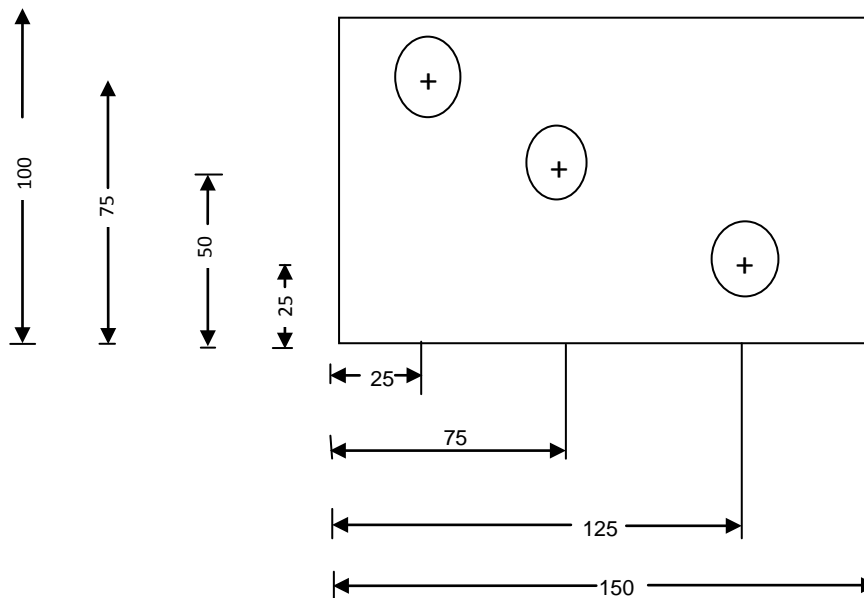
(Common to ME & MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. With a system level block diagram. Explain the architecture of a typical work station used for CAD/CAM.
2. A rectangle has corner co-ordinates (10, 20),(40,20),(40,40),(10,40). The rectangle is rotated by 30° anticlockwise about (a) origin and (b) about the point (40, 20). Compute the new co-ordinates in both cases.
3. In detail explain the salient features of solid modeling. What are the various concepts in it?
4. Write a NC computer aided part program for the part given below for drilling operation by making suitable assumptions required for machining.



All dimensions are in mm

5. What is group technology? When is it suitable in manufacturing? What are its benefits?
6. What is JIT? What are its advantages? Explain its concept in an automated system.
7. Discuss the principles involved in capacity planning in detail.
8. Briefly explain some of the methods used in computer aided quality control.

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B.Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

CAD/CAM

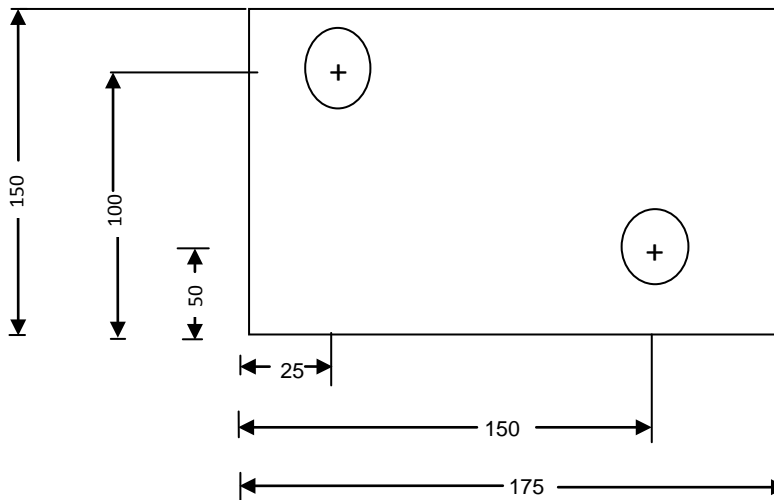
(Common to ME & MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. What is a design work station? Explain various components of it with a block diagram.
2. A rectangle has corner co-ordinates (10, 20),(40,20),(40,40),(10,40). The rectangle is rotated by 45° anticlockwise about (a) origin and (b) about the point (40, 20). Compute the new co-ordinates in both cases.
3. What is solid modeling? Discuss various approaches to solid modeling and its methodology.
4. Write a NC computer aided part program for the part given below for drilling operation by making suitable assumptions required for machining.



All dimensions are in mm

5. Explain the principles of group technology. When is it appropriate to go for group technology? What are its advantages?
6. Discuss the role of human labor in manufacturing systems.
7. With a block diagram, explain shop floor control in an automated factory in detail.
8. How is traditional quality control different from computer aided quality control? Discuss.

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CAD/CAM

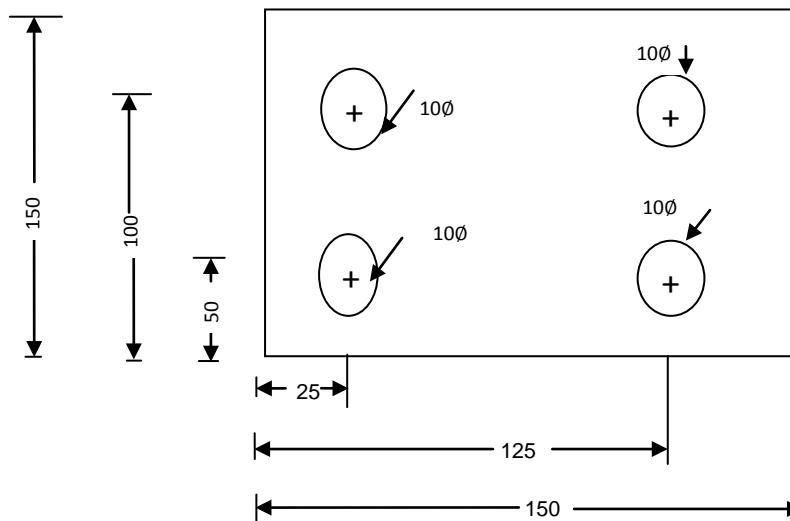
(Common to ME & MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. What is the design work stations importance in CAD/CAM? Explain, how it is different from an ordinary computer system?
2. A rectangle has corner co-ordinates (10, 20), (40, 20), (40,40), (10,40). The rectangle is rotated by 60° anticlockwise about (a) origin and (b) about the point (40, 20). Compute the new co-ordinates in both cases.
3. What is geometric modeling? Explain various modeling methods used for CAD.
4. Write a NC computer aided part program for the part given below for drilling operation by making suitable assumptions required for machining.



All dimensions are in mm

5. What are part families? How are they formed? How are they related to group technology? Give examples of some part families.
6. What are the constituents of IMS? Discuss.
7. What do you understand by MRP-I? What are its components? Discuss.
8. (a) What is computer aided quality control?
(b) How is it integrated with CAD/CAM?
(c) What is required for it?

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CAD/CAM

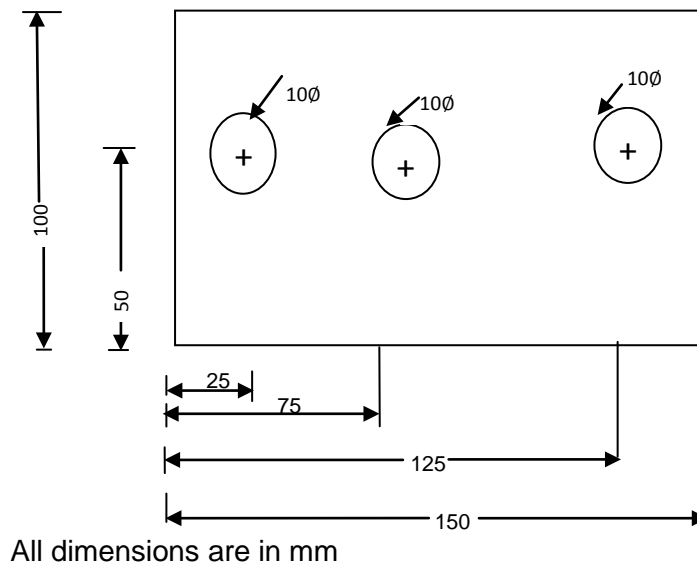
(Common to ME & MCT)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- Compare the relative merits and demerits of different input devices.
 - What are the important hard copy devices used in CAD?
- A rectangle has corner co-ordinates (5, 10), (20, 10), (20,20),(5,20). The rectangle is rotated by 30° anticlockwise about (a) origin and (b) about the point (20, 10). Compute the new co-ordinates in both cases.
- What is a geometric model? Discuss various methods used to create a geometric model.
- Write a NC computer aided part program for the part given below for drilling operation by making suitable assumptions required for machining.



- Explain the features of part classification and coding systems. Illustrate with an example.
- What is an IMS? Explain various components of IMS in detail.
- What is material resource planning? Explain with an example and suitable block diagrams.
- Discuss the importance of computers in quality control in detail.

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B.Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

METROLOGY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Discuss the effect of temperature on the application of limits.
(b) Discuss how tolerance and geometry are related.
- 2 Give an account of the two material standards of length. What are the disadvantages with them? How are those problems overcome with wave length standards?
- 3 (a) How will you calibrate a given straight edge? Indicate the various steps involved explaining the method of calculation.
(b) How will you use the calibrated straight edge for determining the straightness errors of another component?
- 4 Why is it not possible to produce a perfectly smooth surface by machining process? Discuss the causes.
- 5 (a) Name the important dimensions of V- thread which control the fitting of threads.
(b) Explain why it is essential to measure/gauge the different elements of any screw thread.
- 6 Describe the various alignments tests with sketches on pillar type drilling machine.
- 7 (a) What elements of spur gear should be tested to confirm its overall efficiency?
(b) Describe suitable methods for testing the important geometric features of a ground 'Master' gear.
- 8 (a) Explain the various surface treatments process.
(b) Write their merits and demerits of each process.

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B.Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

METROLOGY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Define a fit. What are the different types of fits? Explain each in detail. Quote examples of each type of fit.
- 2 Discuss in detail the procedure in manufacture and generation of slip gauges.
- 3 (a) Define flatness error. What are the methods of measuring flatness error?
(b) Describe briefly the accuracy requirements for flatness of a cast iron surface plate. How do those requirements limit the use of CI surface plates for precision measurements?
- 4 (a) Describe briefly the flow velocity type pneumatic comparators. Mention any specialty of these comparators.
(b) List out the advantages and applications of pneumatic comparators.
- 5 (a) What is mean by drunken thread? How it is caused? What difficulties does it present in finding the pitch of the thread?
(b) Name the important dimensions of V- thread which control the fitting of threads.
- 6 (a) Explain the set of alignment tests is to be carried out on a pillar type drilling machine.
(b) List the equipment required and describe the procedure which should be followed.
- 7 (a) Explain with aid of a diagram a typical 'Rolling' gear tester. Describe four different tests which can be carried out on this equipment and information expecting from each test.
(b) A 40 teeth gear of module 2.5 mm is to be checked by measuring the distance over two pins inserted in the tooth spaces at opposite sides of the wheel. Calculate the diameter of the pin which will rest with its centre at the point and determine the measurement over the pins.
- 8 (a) Explain the thermal spraying.
(b) Explain the materials used in thermal spraying. Explain their applications.

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METROLOGY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
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- 1 (a) By means of simple diagrams representing the hole and shaft, show the essential conditions for: (i) Clearance fit. (ii) Interference fit. Give practical example for each.
(b) A steel shaft is made within limits on its diameter of 60.02 and 50.96 mm. State the upper and lower limits of bore size of a bush to give a maximum clearance of 0.1 mm and minimum clearance of 0.02 mm.
- 2 Discuss the procedure of subdivisions of the end standard by Brooke's level comparator.
- 3 (a) Discuss about the following terms related to testing of optical flat:
(i) Flatness test.
(ii) Parallelism test.
(b) Write a note on the care to be taken in the use of optical flat.
- 4 (a) Show the schematic representation of roughness on machined components.
(b) Explain the terms form factor and bearing area curve.
- 5 (a) Name the important dimensions of V- thread which control the fitting of threads.
(b) Explain why it is essential to measure/gauge the different elements of any screw thread.
- 6 (a) Explain the tests for the flatness of bed and for the straightness and parallelism of bed ways of a lathe machine.
(b) Explain the tests for the true running of the head stock centre.
- 7 (a) Explain various methods with neat sketches, generally used for measuring the gear tooth thickness.
(b) Describe suitable methods for testing the important geometric features of a ground 'Master' gear.
- 8 (a) Explain the different types of surface modification process.
(b) Explain their applications in various fields.

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METROLOGY

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Discuss the following in respect of IS 919: 1969
 - (a) Grades of tolerance.
 - (b) Fundamental deviations.

- 2 What is the procedure of transfer from line standard to end standard? Give example.

- 3
 - (a) What are the conditions that have to be satisfied for interference to occur?
 - (b) Discuss about the sources of light suitable for interferometry.

- 4
 - (a) What are the different lay patterns that may observe in different machining operations?
 - (b) Explain the methods of numerically expressing the surface roughness.

- 5
 - (a) Indicate briefly the effect of the lead angle on a three wire measurement for an effective diameter of a screw thread.
 - (b) Using three wires of 2.5 mm diameter over the threads of M 60 x4 mm bolt, a micrometer reading of 61.4012 mm was obtained. Find the pitch error and hence the deviation in the included angle.

- 6
 - (a) Explain the tests for the true running of the main spindle and its axial movements.
 - (b) Explain the tests for the parallelism of spindle axis to guide ways.

- 7
 - (a) State the instruments used to find the base tangent thickness of a gear tooth.
 - (b) Calculate length of the base tangent over two teeth for helical gear having the following specifications: Width of the gear: 30 mm, No.of teeth: 10, helix angle: 30° , pressure angle: 20° , module: 4

- 8
 - (a) What are the advantages of surface engineering?
 - (b) Explain various methods used to protect the surface of the base metals.

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B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Differentiate engine, refrigeration and heat pump. How their performances are measured?
(b) Describe the working of vacuum refrigeration system.
- 2 (a) Differentiate between dry and wet compression. What are the advantages of one over the other?
(b) A simple NH_3 vapour compression system has compressor with piston displacement of $2 \text{ m}^3/\text{min}$, a condenser pressure of 15 bar and evaporator pressure of 2.5 bar. The liquid is sub cooled to 20°C . The vapour entering the compressor is dry and saturated. The compression is isentropic. $\eta_{\text{vol}} = 80\%$. Calculate:
(i) C.O.P. (ii) Mass flow rate kg/min . (iii) Compressor power. (iv) Plant capacity.
- 3 (a) Which refrigerants require centrifugal compressor? Where these refrigerants are in practice? Give four examples.
(b) What is a secondary refrigerant? Where it is used?
- 4 (a) Why purging is required in Li-Br system? With a neat sketch describe purge unit used in Li-Br system.
(b) What are the four basic components of an absorber machine?
- 5 (a) List out the merits and demerits of vortex tube over other refrigeration system.
(b) What are the fields of applications of vortex tube?
- 6 On a particular day, the atmospheric air was found to have a dry bulb temperature of 30°C and a wet bulb temperature of 18°C . The barometric pressure was observed to be 756 mm of Hg. Using the tables of psychrometric properties of air, determine the relative humidity, the specific humidity, the dew point temperature, the enthalpy of air per kg of dry air and the volume of mixture per kg of dry air.
- 7 (a) What are the different methods used to remove odour from the air? Explain any one of them in detail.
(b) Using a suitable diagram describe a refrigerator and a heat pump.
- 8 (a) Explain schematically on the psychrometric chart and by schematic diagram, summer air conditioning system and winter air conditioning system.
(b) Explain the concept of effective sensible heat factor for room to be air conditioned. How is it useful to find the ADP for fixed room design condition?

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REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Name five means of producing refrigeration.
(b) Derive an expression for C.O.P of air refrigeration system working on Bell-Coleman cycle.
- 2 (a) State the functions of the following parts of a simple vapour compression system.
(i) Compressor. (ii) Condenser.
(iii) Expansion valve (iv) Evaporator.
(b) A heat pump using NH_3 as the refrigerant operates between saturation temperature of 6°C and 38°C . The refrigerant is compressed isentropically from dry saturated and there is a 6 K of under cooling in the condenser. Calculate: (i) C.O.P. (ii) The mass flow of refrigerant / KW power input. (iii) The heat available per KW power input.
- 3 (a) What specific characteristics required for lubricating oil when the refrigerant used:
(i) NH_3 . (ii) SO_2 . (iii) CO_2 .
(b) Name various methods commonly used for leak detection of various refrigerants.
- 4 (a) With the help of a neat sketch explain, the working of an industrial vapor absorption refrigeration system.
(b) Describe the properties of aqua- NH_3 which are useful for the analysis of vapor absorption system.
- 5 (a) What is the situation under which the steam jet refrigeration system is recommended? What are its limitations? Can it be used for obtaining subzero temperatures.
(b) Explain the various components of steam jet refrigeration system and clearly discuss the function of each component.
- 6 Atmospheric air at 0.965 bars enters the adiabatic saturator. The wet bulb temperature is 20°C and dry bulb temperature is 31°C during adiabatic saturation process. Determine:
(i) humidity ratio of the entering air; (ii) vapour pressure and relative humidity at 31°C ;
(iii) dew point temperature.
- 7 300 m^3 air is supplied per minute from outdoor conditions of 40°C DBT and 26°C WBT to an air-conditioned room. The air is dehumidified first by a cooling coil having bypass factor 0.32 and dew point temperature 15°C and then by a chemical dehumidifier. Air leaves the chemical dehumidifier at 30°C DBT. Air is then passed over a cooling coil whose surface temperature is 15°C and bypass factor is 0.26. Calculate the capacities of the two cooling coils and the dehumidifier.
- 8 (a) Explain the importance of comfort chart.
(b) Distinguish between water inter cooling and flash inter cooling of a compound compression system.

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REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain open cycle and closed cycle air refrigerator working on a Bell-Coleman cycle.
(b) Why air is used as a refrigerant in air crafts?
- 2 (a) Why in practice a throttle valve is used in V.C.R. system rather than an expansion cylinder to reduce pressure between condenser and the evaporator?
(b) Determine the theoretical C.O.P. for CO₂ machine working between the temperature range of 25°C and -5°C. The dryness fraction of CO₂ gas during the suction stroke is 0.6. The following properties are given:

Temp (°C)	Heat kJ/Kg		Latent Heat (KJ/Kg)	Entropy (KJ/Kg)	
	Liquid	Vapour		Liquid	Vapour
25	81.17	202.5	121.34	0.251	0.644
-5	-7.53	236.8	245.2	-0.042	0.841

How many tons of ice would a machine working between the same limits and having a relative coefficient of performance of 45% make in 24 hours? The water for ice is supplied at 15°C and the compressor takes 8.2 Kg of CO₂/minute. Specific heat of water may be taken as 4.18 kJ/kg °C and latent heat of ice as 335 kJ/kg.

- 3 (a) Which are the refrigerants preferred for household refrigerator, ice-production plant? Explain.
(b) What is greenhouse effect? What are the measures to overcome green house effect?
- 4 (a) Mention the function of each fluid in a three fluid vapor absorption system.
(b) Write at least five main factors affecting C.O.P of Li-Br absorption system.
- 5 Explain with the help of a neat sketch, the working of a steam jet refrigeration system.
- 6 (a) Define room sensible heat factor. How room sensible heat factor line is drawn on the psychometric chart?
(b) Explain the procedure to draw a grand sensible heat factor line on a psychometric chart.
- 7 An office of 25 people in Mumbai is to be air conditioned when outdoor conditions are 29°C DBT and 73% RH. The required comfort conditions are 21°C DBT and 59% RH with 0.5 m³/min/person fresh air supply. Air is first cooled, dehumidified and then heated. Calculate the coil capacity, heating coil capacity and capacity of the humidifier.
- 8 Discuss the conditions of comfort that you would prescribe for an office in a city like Hyderabad where hot and dry climate prevails.

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REFRIGERATION & AIR CONDITIONING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Differentiate between simple air refrigeration system and boot strap air refrigeration system.
(b) List the names of three evaporative coolants that can be used in an aircraft refrigeration system at an attitude of 15000 m. How will you estimate the amount of the coolant required for a given flight of aircraft?
- 2 (a) Discuss the effect of the following on the performance of a vapor compression system:
(i) Suction pressure. (ii) Discharge pressure.
(iii) Superheating. (iv) Sub-cooling.
(b) Describe the mechanism of a simple vapor compression refrigeration system.
- 3 (a) Write down the chemical formula for the following refrigerants R_{11} , R_{12} , R_{22} , R_{717} , R_{113} , R_{502} , R_{503} .
(b) What is meant by green house affect? What are the measures to control?
- 4 (a) Why the actual C.O.P of an absorption system is much less than the ideal value?
(b) Prove the equation of maximum C.O.P of a vapour absorption system with usual notations.
- 5 In a steam jet refrigeration system, the motive vapour is saturated at 150.3°C , and the chilled water temperature is 6°C . The mass ratio of the motive vapour to refrigerant vapour is 2.5. Find the saturated discharge temperature of the ejector. Assume the nozzle, entrainment and diffuser efficiencies as 0.85, 0.65 and 0.8 respectively.
- 6 (a) Prove that the enthalpy of the humid air remains constant along a wet bulb temperature line on the psychrometric chart.
(b) Write a short note on by-pass factor for cooling coils.
- 7 (a) What are the advantages and disadvantages of viscous filter over dry filters?
(b) Explain the use of heat pump for heating and cooling cycle with a neat diagram.
- 8 Differentiate between central, district and unitary air-conditioning systems with suitable examples.

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B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

DESIGN OF MACHINE ELEMENTS - II

(Mechanical Engineering)

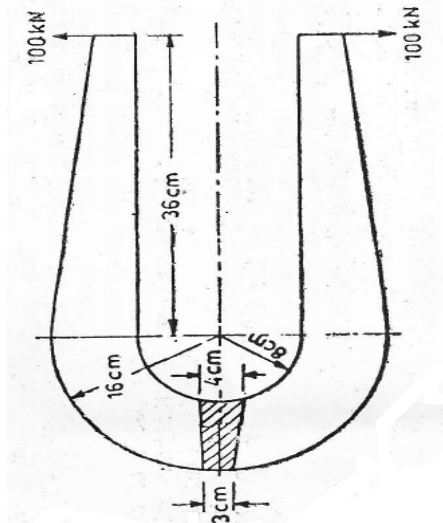
Time: 3 hours

Max. Marks: 70

Design data books are permitted in the examination hall.

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Distinguish between "Hydrodynamic" and "Hydrostatic Bearings" with figures.
(b) How is rolling contact bearing are manufactured?
- 2 Design and sketch a cast iron piston for a single acting four stroke I.C. engine with a 0.14 m cylinder bore 0.19 m stroke and 0.375 m connecting rod length. The maximum gas pressure is 3.5 N/mm^2 and the engine speed is 600 rpm, it develops a brake mean effective pressure of 0.7 N/mm^2 and uses 4.65 kJ/KW per second, check the piston for heat flow.
- 3 (a) What is the function of connecting rod?
(b) What are the usual ratio of the connecting rod length and the stroke of piston? How it is decided upon?
- 4 Determine the maximum stress, if the direction of the load is reversed.



figure

Contd. in Page 2

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- 5 (a) Discuss the different types of belts and their material used for power transmission.
(b) Discuss the various important parameters necessary for the selection of a particular drive for power transmission.
- 6 A pair of helical gears is to transmit 15 KW. The teeth are 20° stub in diametral plane and have a helix angle of 45° . The pinion runs at 10000 r.p.m. and has 80 mm pitch diameter. The gear has 320 mm pitch diameter. If the gears are made of cast steel having allowable static strength of 100 MPa; determine a suitable module and face width from static strength considerations and check the gears for wear, given $\sigma_{es} = 618$ MPa.
- 7 (a) Discuss the materials and practical applications for the various types of springs.
(b) A helical spring is made from a wire of 6 mm diameter and has outside diameter of 75 mm. If the permissible shear stress is 350 MPa and modulus of rigidity 84 kN/mm^2 , find the axial load which the spring can carry and the deflection per active turn.
- 8 (a) List the type of threads used in power screws. Give practical example for each type of threads.
(b) State advantages and disadvantages of using different types of threads in power screws.

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DESIGN OF MACHINE ELEMENTS - II

(Mechanical Engineering)

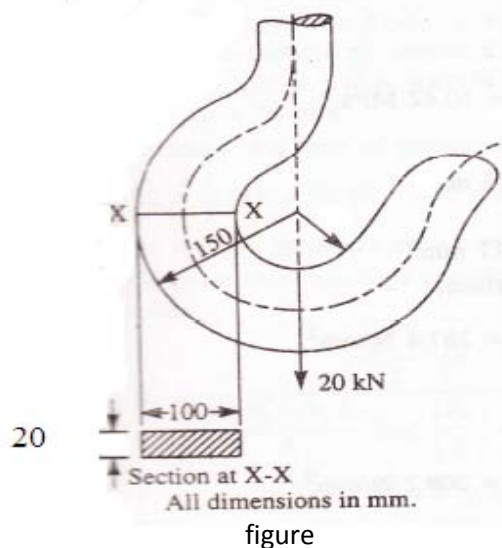
Time: 3 hours

Max. Marks: 70

Design data books are permitted in the examination hall.

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What are the different bearing materials?
(b) Describe the various stages of friction in the case of plain bearings.
- 2 (a) List various liner materials used in the manufacturing of cylinder of I.C. engine.
(b) Explain design calculation of piston barrel and Gudgeon pin.
- 3 (a) Compare centre and side crank, crank shafts.
(b) Explain any one with neat sketch with design considerations.
- 4 The crane hook carries a load of 20 kN, as shown in figure. The section at X-X is rectangular whose horizontal side is 100 mm. Find the stresses in the inner and outer fibers at the given section.



- 5 (a) What are the advantages and disadvantages of V-belt drive over flat belt drive?
(b) Derive the relation for the ratio of driving tensions of a V-belt.

Contd. in Page 2

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- 6 (a) Write a short note on gear drives giving their merits and demerits.
- (b) It is required to design a pair of spur gears with 20° full depth involute teeth based on Lewis equation. The velocity factor is to be used to account for dynamic load. The pinion shaft is connected to a 10 KW, 1440 r.p.m motor. The starting torque of the motor is 150% of the rated torque. The speed reduction is 4:1. The pinion as well as the gear are made of plain carbon steel 40C8 ($\sigma = 600 \text{ N/mm}^2$). The factor of safety can be taken as 1.5. Design the gear, specify their dimensions.
- 7 (a) A helical torsion spring of mean diameter 60 mm is made of a round wire of 6 mm diameter. If a torque of 6 N-m is applied on the spring, find the bending stress induced and the angular deflection of the spring in degrees. The spring index is 10 and modulus of elasticity for the spring material is 200 kN/mm^2 . The number of effective turns may be taken as 5.5.
- (b) Design a leaf spring for the following specifications: Total load = 140 kN; number of springs supporting the load = 4; maximum number of leaves = 10; span of the spring = 1000 mm; permissible deflection = 80 mm. Take Young's modulus, $E = 200 \text{ kN/mm}^2$ and allowable stress in spring material as 600 MPa.
- 8 A bar is raised and lowered by two 40 mm square threads having a pitch of 10 mm. Determine the force required at a radius of 80 mm to raise or lower at 10000 N cross bar of a planer. The screw and nut materials are steel bronze respectively. The collar materials are steel and bronze respectively. The collar material is steel; it has an outside diameter of 76 mm and an inside diameter of 38 mm; coefficients of friction at threads and at collar are 0.11 and 0.13 respectively.

Code: 9A03605

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

DESIGN OF MACHINE ELEMENTS - II

(Mechanical Engineering)

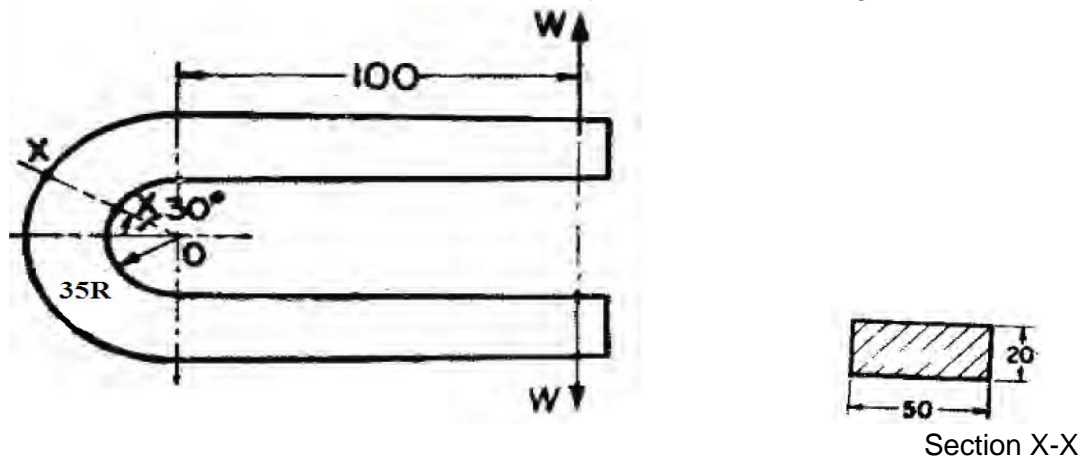
Time: 3 hours

Max. Marks: 70

Design data books are permitted in the examination hall.

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain squeeze film lubrication.
(b) Find the "Rating Life" of the 50 mm bore, light series ball journal bearing under 6800 N radial load at 600 rpm. The load is out of balance and therefore rotates with inner ring. There is no shocking load.
- 2 (a) Explain the different parts of a trunk piston. Explain with figure.
(b) Explain cylinder liner distortion and cylinder lubrication.
- 3 (a) What are the methods and materials used in manufacturing crank shaft?
(b) Explain any one method with neat sketch.
- 4 Determine the stresses at section X-X of the punch as shown in figure $W = 2$ kN.



- 5 Derive $\frac{T_1 - mv^2}{T_2 - mv^2} = e^{\mu \alpha / \sin(\theta/2)}$ for a V belt, Where T_1 and T_2 are the tensions in the belt and "m" mass of 1 m belt, μ coefficient of friction; α angle of wrap. State the assumptions clearly.

Contd. in Page 2

- 6 A cast steel spur pinion ($\sigma_d = 200$ MPa) running at 450 r.p.m transmits 20 KW power to a cast iron gear ($\sigma_d = 80$ MPa) running at approximately 112 r.p.m. the load is steady, design the drive and check for dynamic and wear loads.
- 7 A semi-elliptical laminated vehicle spring to carry a load of 8000 N is to consist of seven leaves 75 mm wide, two of the leaves extending the full length of the spring. The spring is to be 1.1 m in length and attached to the axle by two U-bolts 80 mm apart. The bolts hold the central portion of the spring so rigidly that they may be considered equivalent to a band having a width equal to the distance between the bolts. Assume a design stress for spring material as 350 MPa. Determine:
- (i) Thickness of leaves.
 - (ii) Deflection of spring.
 - (iii) Diameter of eye.
 - (iv) Length of leaves and
 - (v) Radius to which leaves should be initially bent.
- 8 (a) Show that the efficiency of self locking screws is less than 50 percent.
(b) What is self locking property of threads and where it is necessary?

Code: 9A03605

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

DESIGN OF MACHINE ELEMENTS - II

(Mechanical Engineering)

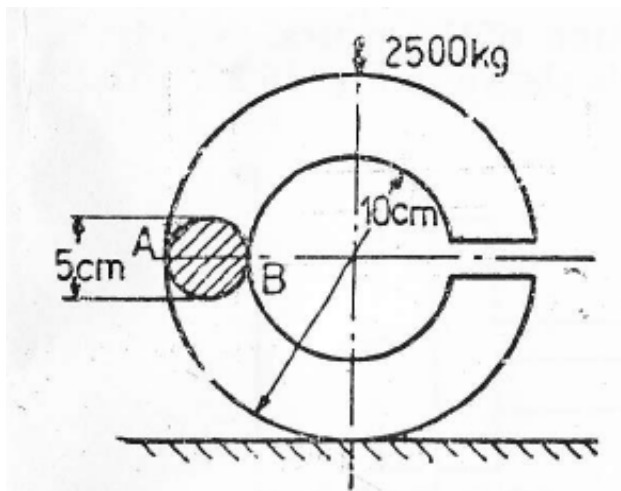
Time: 3 hours

Max. Marks: 70

Design data books are permitted in the examination hall.

Answer any FIVE questions
All questions carry equal marks

- 1 A bearing is required for a 35 mm shaft. It is to operate for 8 hrs per day. 5 days per week for 5 years and is to carry a stationary radial load of 2250 N at 1500 rpm, inner ring rotating. There is a possibility of light shock. Select a suitable bearing
- 2 (a) What are the functions of a trunk piston? Explain with figure.
(b) Explain good qualities of good cylinder liners.
- 3 (a) What are the "Shims" and their uses explain?
(b) Write about "Crush" in connecting rod.
- 4 A ring is made of a 5 cm diameter round bar as shown in figure. Calculate the stresses at point, A and B.



figure

- 5 A pulley is driven by a flat belt running at a speed of 600 m/min. The coefficient of friction between the pulley and the belt is 0.3 and the angle of lap is 160° . If the maximum tension in the belt is 700 N; find the power transmitted by a belt.

Contd. in Page 2

- 6 A helical cast steel gear with 30° helix angle has to transmit 25 KW at 2000 r.p.m. if the gear has 25 teeth, determine the necessary module and face width of the gear. The tooth profile is 20° full depth involute and static strength of the gear material is 56 MPa. Take the face width of the gear as 3 time the normal pitch and velocity factor $(C_v) = \frac{15}{15 + v}$, where v is the pitch line velocity in m/s.
- 7 Design and draw a valve spring of a petrol engine for the following operating conditions :
Spring load when the valve is open = 500 N.
Spring load when the valve is closed = 350 N.
Maximum inside diameter of spring = 30 mm.
Length of the spring when the valve is open = 40 mm.
Length of the spring when the valve is closed = 50 mm.
Maximum permissible shear stress = 450 MPa.
- 8 (a) How does the helix angle influence on the efficiency of square threaded screw?
(b) Discuss the various types of power threads. Give atleast two practical applications for each type. Discuss their relative advantages and disadvantages.

Code: 9A03606

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

AUTOMOBILE ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 What are the important basic components of an internal combustion engines? Explain them briefly.
- 2 (a) Define carburetion. What are the factors that affect carburetion?
(b) Name the different methods of fuel injection system. Describe with neat sketch the airless solid injection system in C.I. engines.
- 3 (a) Explain with neat diagrams the different types of cooling systems used in automobile engines.
(b) Explain briefly how the high voltage required for sparking is built up by the battery ignition system.
- 4 (a) What are the sources of HC formation in petrol engine? Explain various factors which effect the HC formation.
(b) What are the methods used to control diesel particulate emissions?
- 5 Describe in detail the procedure for servicing of a generator regulator mentioning clearly how correct regulator setting is obtained.
- 6 Explain why two Hook's joints are used to transmit motion from the engine to the differential of an automobile.
- 7 Write short notes on following:
(a) Camber.
(b) Caster.
(c) Ackerman steering principle.
- 8 Briefly explain the need for shock absorbers in the suspension system of the vehicles.

Code: 9A03606

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

AUTOMOBILE ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) On a hilly track, performance of a rear wheel driven vehicle is superior compare to front wheel drive vehicle. Explain the reasons.
(b) Describe the different types of piston use in I.C engines.
- 2 (a) List the various parts of fuel feed system of a car. Draw a diagram showing these parts in respective positions.
(b) What are the types of air filters? Describe with a neat sketch the working principle of oil bath type air filter.
- 3 (a) How engines are air-cooled? What is the purpose of the fins in an air-cooled system? What is the size and spacing of fins?
(b) Sketch and explain the working principle of water pump.
- 4 (a) Compare the diesel engine and gasoline engine emissions.
(b) Discuss the air pollution from gas turbines and compare it with emissions from petrol engines.
- 5 How does the Bendix drive separate the starting motor from the engine flywheel after the engine starts?
- 6 Explain briefly the power transmission to the drive wheels using variable speed pulleys.
- 7 Write a short notes on following:
(a) Centre point steering.
(b) Over steer and under steer.
(c) Backlash in steering gears.
- 8 What is the purpose of independent suspension? Is there Indian vehicle using this type of suspension for the front axle. If so, mention the vehicle and explain the system fully.

Code: 9A03606

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

AUTOMOBILE ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain with neat sketches different types of automobile engines used in automobiles.
- 2 (a) Discuss the common rail fuel injection system. What are its merits and demerits?
(b) Illustrate the construction and working principle of a fuel injector.
- 3 (a) Describe briefly the various components of water cooling system.
(b) Describe with diagram, the battery coil ignition system.
- 4 (a) What is diesel odour? Explain the effects of different factors on the formation of odour in CI engines.
(b) What are the methods of controlling the oxides of nitrogen presenting in an IC engine exhaust? Describe any one of them.
- 5 (a) Describe the common faults occurring in the generators.
(b) Explain fully how these faults may be detected and remedied.
- 6 With the help of a neat sketch, explain the construction and operation of a constant mesh gear box.
- 7 Describe with the help of neat sketch, the working of the power steering unit.
- 8 What is the purpose of independent suspension system? How is it achieved in front and rear axles?

Code: 9A03606

B. Tech III Year II Semester (R09) Regular & Supplementary Examinations, April/May 2013

AUTOMOBILE ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain the following :
 - (a) Rear wheel drive.
 - (b) Front wheel drive.

- 2
 - (a) How are injection system classified? Describe them briefly. Why the air injection system is not used now a days?
 - (b) Sketch a mechanical fuel pump and describe its working principle.

- 3
 - (a) What is the film coefficient? On what factors the film coefficient generally depends.
 - (b) Compare air cooling and water cooling systems.

- 4
 - (a) What is the different exhaust gas after treatment tried to reduce pollutants?
 - (b) How evaporate emission control is achieved in SI engines?

- 5
 - (a) What are the various types of starting drives in automobile engine?
 - (b) Explain with neat sketch any one type of starting drive.

- 6 What is a torque converter? Why it is used in some vehicles?

- 7 Define camber angle. What is the function of camber in vehicle?

- 8 Give a neat sketch, explain the construction and working of a hydraulic shock absorber.
