

BE (Mech) Sem-VIII 15/6/15, Re-exam.
Design of mechanical system

BHARATIYA VIDYA BHAVAN'S
SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)
MUNSHI NAGAR, ANDHERI (WEST), MUMBAI- 400 058

RE-EXAMINATION

CLASS/SEM: B.TECH.(Mech) Sem VIII
SUBJECT: Design of Mechanical System

Total Marks: 100

Duration: 4 Hour

Date: June 2015

- Question no. 1 is compulsory. Attempt any four out of remaining six questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Use of PSG data book is permitted. Refer Annexure 1 for additional design data.
- Assume suitable data if necessary.

Master

- a) Derive expression for conveyor belt capacity in tons/hour in terms of belt width for both flat and troughed belt. (4)
 - b) Give general classification of material handling systems. Under each classification type, list the names of related systems. (4)
 - c) Explain the methods used to balance axial thrust in centrifugal pumps. (4)
 - d) Write a short note on external gear pumps and compare them with internal gear pumps. (4)
 - e) Give classification of pressure vessels in terms of their function and service. How MAWP is calculated for a pressure vessel? (4)
- a) Explain the design of hoisting brake for an EOT crane. (5)
 - b) A vertical reactor vessel of welded construction has following design specification. (15)

| | |
|--------------------------------------|--|
| Inside diameter = 1850 mm | Material - Alloy steel |
| Straight length of shell = 12,000 mm | Liquid level = 5,000 mm from bottom head to shell weld joint |
| Type of heads = Hemispherical | Liquid specific gravity = 1.3 |
| Design internal pressure = 8.5 MPa | Allowable stress = 180 MPa |
| Design temperature = 385° C | Corrosion allowance = 3 mm |
| Joint efficiency = 0.95 | Hydrotest pressure = nil |

Calculate: (i) Thickness of shell, (ii) thickness of top and bottom heads, (iii) suitable schedule for 550 mm nominal size nozzle pipe for the vessel, (iv) MAWP of vessel based on provided thickness of shell, heads and nozzle pipe.

- a) Explain why a flat belt conveyor is considered as a mechanical system and not a single unit during its design. Taking this as an example, illustrate the general methodology adopted to design any mechanical system. (5)

BEC (Mech), Sem - VIII, 15/6/15, Re-exam
Design of mechanical system

- b) Design a gear pump to deliver automotive grade oil at discharge rate of 165 liters/minute. The delivery pressure is 28 bar. The pump is directly connected to an electric motor. The design calculations should include: gear size, suction and discharge pipe size, shaft diameter, casing thickness and power rating of electric motor. (15)
4. a) Explain different types of take-up units and belt cleaning devices employed in belt conveyor system. (5)
- b) Design a centrifugal pump to develop total head of 75 meters; the medium is seawater at 20°C and discharge rate is 80 m³/hr. The pump is directly driven by an electric motor. Determine power requirement and select suitable motor for the pump. Calculate the suction pipe diameter, impeller dimensions and number of vanes. (15)
5. a) List different types of positive displacement pumps. Explain the working of peristaltic pump with a sketch. (5)
- b) Design a 24° troughing belt conveyor to transfer 160 tons/hour of dry sand through a horizontal distance of 125 m and vertical height of 25 m. The belt speed is to be limited to 2.75 m/s. Secondary resistance for belt wrapping around pulley (R_w) can be taken as 400 N (total). Assume suitable coefficient of rolling friction between idler and belt, friction factor between belt and pulley and the angle of belt wrap around pulley. Design should include following. (15)
- (i) Belt width.
 - (ii) Calculation of belt resistances and belt-tension.
 - (iii) Selection of belt fabric.
6. a) Describe the method to calculate thickness of cover plate and cover plate bolts in gear pump. Can this method be applied to any other bolted system? Give your comment. (5)
- b) Following specification refers to an EOT crane. (15)
- Class of mechanism = M3 (equivalent to old-standard class I)
 - Hook load = 50 kN
 - Height to which load is raised = 6 m
 - Dead weight of hoisting system = 2 kN
 - Braking time for hoist = 3 seconds
 - Hoisting velocity = 12 m/min
 - Number of rope falls = 4
 - Efficiency of pulley system = 0.95
 - Weight of trolley = 3 kN
 - Speed of trolley = 25 m/min
 - Trolley wheel and wheel-axle diameters = 200 and 45 mm
- (i) Select suitable size of rope.
 - (ii) Calculate size of bumper springs for the trolley
 - (iii) Calculate power rating of electric motor to drive trolley.

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 Design of mechanical system

7. a) What is significance of nozzle reinforcement calculations in pressure vessel design? (5)
 Explain the design procedure to calculate reinforcement requirement for nozzle connection in pressure vessel.
- b) Describe components of a snatch block in EOT crane with sketch. Briefly explain (5)
 design of its major components.
- c) Discuss the different types of resistances considered in design of conveyor belt (5)
 system.
- d) Explain the procedure used to draw the profile of vanes in the impeller of centrifugal (5)
 pump.

Annexure 1

(All symbols indicate their conventional meaning)

Impact factor for structural components of EOT crane (IS 3177)

| Class | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 |
|---------------|------|------|------|------|------|------|------|------|
| Impact factor | 1.06 | 1.12 | 1.18 | 1.25 | 1.32 | 1.40 | 1.50 | 1.50 |

Standard diameters of rope drum at the bottom of groove: 200, 250, 315, 400, 500, 630, 710, 800, 900, 1000, 1250 mm.

Some useful relationships for design of centrifugal pump:

$$\text{Suction pipe diameter, } D_s = \sqrt{\frac{4Q'}{\pi V_s} + d_n^2}$$

$$\text{where } Q' = (\text{leakage factor}) \times Q, \quad V_s = V_0 = V\epsilon, \quad V = \sqrt{2gH},$$

$$\epsilon = 0.023\sqrt{n_q}$$

$$\text{Inlet vane width, } b_1 = \frac{Q'}{\pi D_1 V_0}$$

$$\text{Outlet vane width, } b_2 = \frac{Q'}{\pi D_2 V_{m3}} \text{ where } V_{m3} = (0.8 \text{ to } 0.9) \times V_0$$

$$\text{Number of vanes, } z = 13 \frac{r_m}{e} \sin \beta_m$$

$$\tan \beta_1 = \frac{1.25V_0}{u_1}, \quad u_1 = \frac{\pi n D_1}{60}$$

Design relationships for design of pressure vessels

Design wind pressure in $\text{N/m}^2 = 0.613V^2$, where V is wind velocity in m/s.

BEC member, Sem-VIII, 15/6/15, Re-exam
 Design of mechanical system

Pressure temperature rating class for flanges (Carbon steel)

| Working Pressure by Classes, bar | | | | | | | |
|----------------------------------|------|------|------|-------|-------|-------|-------|
| Class Temp., °C | 150 | 300 | 400 | 600 | 900 | 1500 | 2500 |
| -29 to 38 | 19.8 | 51.7 | 68.9 | 103.4 | 155.1 | 258.6 | 430.9 |
| 50 | 19.5 | 51.7 | 68.9 | 103.4 | 155.1 | 258.6 | 430.9 |
| 100 | 17.7 | 51.5 | 68.7 | 103.0 | 154.6 | 257.6 | 429.4 |
| 150 | 15.8 | 50.2 | 66.8 | 100.3 | 150.5 | 250.8 | 418.1 |

Pipe schedule

| NPS inches | N.D. | O.D. mm | 10 | 20 | 30 | STD | 40 | 60 | XS | 80 | 100 | 120 | 140 | 160 | XXS |
|---------------|------|------------|------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-----|
| 22 | 550 | 558.8 | 6.35 | 9.53 | 12.70 | 9.52 | 15.87 | 22.22 | 12.7 | 28.57 | 34.92 | 41.27 | 47.62 | 53.97 | - |
| 24 | 600 | 609.6 | 6.35 | 9.53 | 12.70 | 9.52 | 17.47 | 24.61 | 12.7 | 30.96 | 38.89 | 46.02 | 52.37 | 59.54 | - |
| 26 | 650 | 660.4 | 7.92 | 12.70 | - | 9.52 | - | - | 12.7 | - | - | - | - | - | - |

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BE (Mech) Sem - VIII
Design of Mechanical Systems.

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27/04/15

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SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)
MUNSHI NAGAR, ANDHERI (WEST), MUMBAI- 400 058

END-SEMESTER

CLASS/SEM: **B.TECH.(Mech) Sem VIII**
SUBJECT: **Design of Mechanical System**

Total Marks: 100

Duration: 4 Hour

Date: April 2015

- Question no. 1 is compulsory. Attempt any four out of remaining six questions.
- Answers to all sub questions should be grouped together.
- Figures to the right indicate full marks.
- Use of PSG data book is permitted. Refer Annexure 1 for additional design data.
- Assume suitable data if necessary.

Master

1. a) Explain with a sketch the simple pulley and multiple pulley systems in the context of material handling system. What are the disadvantages of simple pulley system? (4)
 - b) Describe construction of a conveyor belt with a sketch. How belts are designated? Explain the methods used to join ends of conveyor belts. (4)
 - c) Compare between centrifugal and positive displacement pumps. (4)
 - d) Which region of gear pump is likely to trap the internal fluid and cause noise? How this problem is addressed? How pressure balancing is done in gear pumps? (4)
 - e) Explain the importance of pressure-temperature ratings in pressure vessel design. A carbon steel pressure vessel has design temperature of 140°C. A bolted flange of pressure-temperature rating class 1500 is found suitable to withstand the design conditions. What is the maximum permissible design pressure for the vessel? (4)
2. a) Describe the function of wearing rings employed in centrifugal pumps. Explain different types of wearing rings along with their sketches. (5)
 - b) Following specification refers to an EOT crane. (15)
 - Class of mechanism = M8 (equivalent to old-standard class IV)
 - Hook load = 100 kN
 - Height to which load is raised = 10 m
 - Dead weight of hoisting system = 8 kN
 - Braking time for hoist = 2 seconds
 - Hoisting velocity = 20 m/min
 - Number of rope falls = 4
 - Efficiency of pulley system = 0.95
 - Weight of trolley = 9 kN
 - Speed of trolley = 32 m/min
 - Trolley wheel and wheel-axle diameters = 300 and 75 mm

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BEC mechanical) Sem-VIII, 27/9/16
 Design of mechanical systems

- (i) Select suitable size of rope.
 - (ii) Design rope drum.
 - (iii) Calculate power rating of electric motor to drive trolley.
3. a) Explain working of internal gear pump with a neat sketch. (5)
 b) Design a 22.5° troughing belt conveyor to transfer 160 tons/hour of gypsum through a horizontal distance of 75 m and vertical height of 18 m. The belt speed is to be limited to 2.3 m/s. Secondary resistance for belt wrapping around pulley (R_w) can be taken as 400 N (total). Assume suitable coefficient of rolling friction between idler and belt, friction factor between belt and pulley and the angle of belt wrap around pulley. Design should include following. (15)
- (i) Belt width.
 - (ii) Calculation of belt resistances and belt-tension.
 - (iii) Selection of belt fabric.
4. a) Write a short note on design of structural parts of trolley and bridge for EOT crane. How will you optimize the weight of beams for the bridge? (5)
 b) A centrifugal pump is to be designed to generate total head of 60 meters; the medium is water at 20°C and discharge rate is 120 m³/hr. The pump is directly coupled to an electric motor. Determine power requirement and select suitable motor for the pump. Calculate the suction pipe diameter, impeller dimensions and number of vanes. (15)
5. a) How do you differentiate the design of mechanical systems from that of machine elements? Explain the system design approach with an example of any material handling system. (5)
 b) Design a gear pump to deliver automotive grade oil at discharge rate of 175 liters/minute. The delivery pressure is 50 bar. The pump is directly connected to an electric motor. The design calculations should include: gear size, suction and discharge pipe size, shaft diameter, cover plate thickness, cover bolt size and power rating of electric motor. (15)
6. a) Give a list of different types of pumps used in industry. Describe working of a lobe pump with illustrative figure. (5)
 b) A vertical column vessel of welded construction has following design specification. (15)

| | |
|--------------------------------------|---|
| Inside diameter = 3500 mm | Material = Carbon steel |
| Straight length of shell = 50,000 mm | Liquid level = 15,000 mm from bottom head to shell weld joint |
| Type of heads = Hemispherical | Liquid specific gravity = 0.95 |
| Design internal pressure = 1.5 MPa | Allowable stress = 100 MPa |
| Design temperature = 275° C | Corrosion allowance = 3 mm |
| Joint efficiency = 0.90 | Hydrotest pressure = nil |

Calculate: (i) Thickness of shell, (ii) thickness of top and bottom heads, (iii) suitable schedule for 650 mm nominal size nozzle pipe for the vessel, (iv) MAWP of vessel based on provided thickness of shell, heads and nozzle pipe.

BE (Mech). Sem - VIII, 27/4/15
 Design of Mechanical Systems.

7. a) Describe the types of loadings to be considered in design of EOT crane. (5)
 b) Explain the role of following components of a belt conveyor system. (5)
 (i) Loading and unloading devices
 (ii) Take-up or belt tensioning devices
 (iii) Belt cleaners
 c) Describe the method followed to generate the geometric profile of volute casing for a centrifugal pump. (5)
 d) Define following terms and mention their significance in pressure vessel design. (5)
 (i) Design temperature
 (ii) Corrosion allowance
 (iii) Wind pressure and seismic load
 (iv) Pipe schedule
 (v) MDMT

Annexure 1

(All symbols indicate their conventional meaning)

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Standard diameters of rope drum at the bottom of groove: 200, 250, 315, 400, 500, 630, 710, 800, 900, 1000, 1250 mm.

Some useful relationships for design of centrifugal pump:

$$\text{Suction pipe diameter, } D_s = \sqrt{\frac{4Q'}{\pi V_s} + d_n^2}$$

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$$\tan \beta_1 = \frac{1.25V_0}{u_1}, \quad u_1 = \frac{\pi n D_1}{60}$$

Design relationships for design of pressure vessels

Design wind pressure in $\text{N/m}^2 = 0.613V^2$, where V is wind velocity in m/s.

Page (3)

BEC (mech), Sem-VIII, 27/11/18
 Design of mechanical systems.

Pressure temperature rating class for flanges (Carbon steel)

| Working Pressure by Classes, bar | | | | | | | |
|----------------------------------|------|------|------|-------|-------|-------|-------|
| Class Temp., °C | 150 | 300 | 400 | 600 | 900 | 1500 | 2500 |
| -29 to 38 | 19.8 | 51.7 | 68.9 | 103.4 | 155.1 | 258.6 | 430.9 |
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Pipe schedule

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|---------------|------|------------|------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|-----|
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| 24 | 600 | 609.6 | 6.35 | 9.53 | 12.70 | 9.52 | 17.47 | 24.61 | 12.7 | 30.96 | 38.89 | 46.02 | 52.37 | 59.54 | - |
| 26 | 650 | 660.4 | 7.92 | 12.70 | - | 9.52 | - | - | 12.7 | - | - | - | - | - | - |

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2015

Duration : 3 hrs

Total Marks : 100

CLASS / SEM : B.E(Mech.) Sem- VIII

SUBJECT: CAD/CAM/CIM

- Attempt any five questions out of seven questions
- If there are sub questions, answers to sub questions should be grouped together
- Figures to the right indicate full marks
- Assume Suitable data wherever necessary

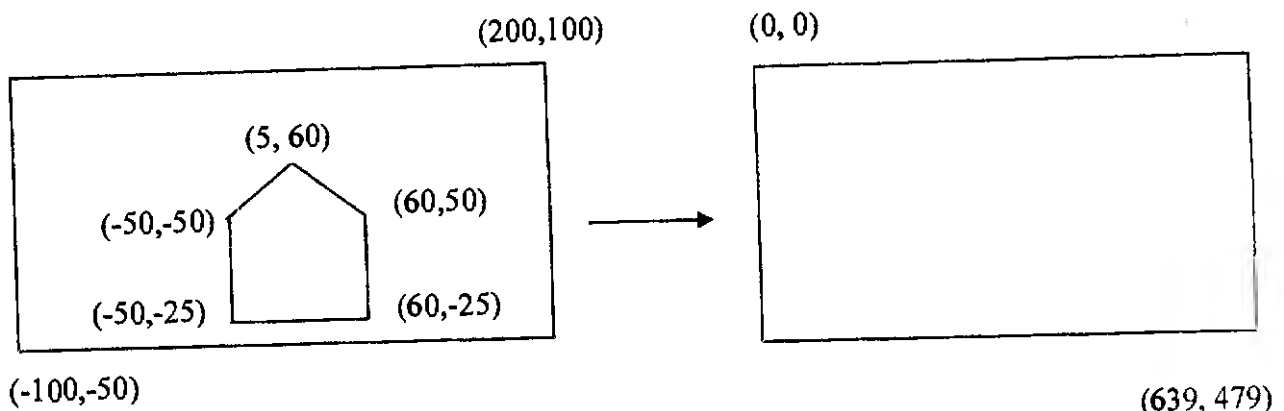
Master

Q.1 (a) Develop a C++ program to carry out following transformations on a 2D object like line. Insert necessary comments wherever necessary. [20]

- 1) Shear
- 2) Rotation
- 3) Reflection
- 4) Translation

Q.2 (a) (i) What do you understand by the terms "Window" & "Viewport". Derive the mapping for any given point (X_w, Y_w) from the window onto the viewport. [10]

(ii) Figure below depicts a picture in the "window" for the "viewport" shown Alongside. Find the Normalization transformation & draw the mapped picture.



(b) Explain the different types of different Geometric Modeling techniques with neat sketches [10]

CAD/CAM/CIM

Q.3 (a) How the line between (2,2) & (12,9) is clipped against a window with $(X_{wmin}, Y_{wmin}) = (4,4)$ and $(X_{wmax}, Y_{wmax}) = (9,8)$ using Cohen Sutherland Algorithm. [05]

(b) Using Bresenham's Circle Algorithm produce sequence of atleast five points along the circumference of the circle with radius = 20 and centered at (50,50). Write all the iterations required. [05]

(c) Explain the Painters Algorithm with neat sketches [10]

Q.4 (a) Construct the Bezier Curve of order 3 & with 4 polygon vertices A (1, 1), B (2, 3) C (4, 3), D (6, 4). Also calculate the points on the Bezier Curve. Write all the detail steps involved [10]

(b) Explain Reverse Engineering & data capture techniques in detail along with neat Sketches [10]

Q.5 (a) A triangle is defined by three vertices A (0,2,1) B (2,3,0) C (1, 2, 1). Find the final Coordinates after it is rotated by 45 degree around a line joining the points (2,2,2) and (1,1,1) [10]

(b) Triangle PQR has vertices as P (2, 4), Q (4, 6), and R (2, 6). It is desired to reflect through an arbitrary line L whose equation is $Y=0.5x+2$. Calculate the new vertices of triangle. [10]

Q.6 (a) Write an APT part program for the profile shown in the figure no.1 with cutting speed and feed rate of 500 rpm and 100mm/min respectively. The cutter is of 10 mm dia. Use MACRO statement for drilling operations? [10]

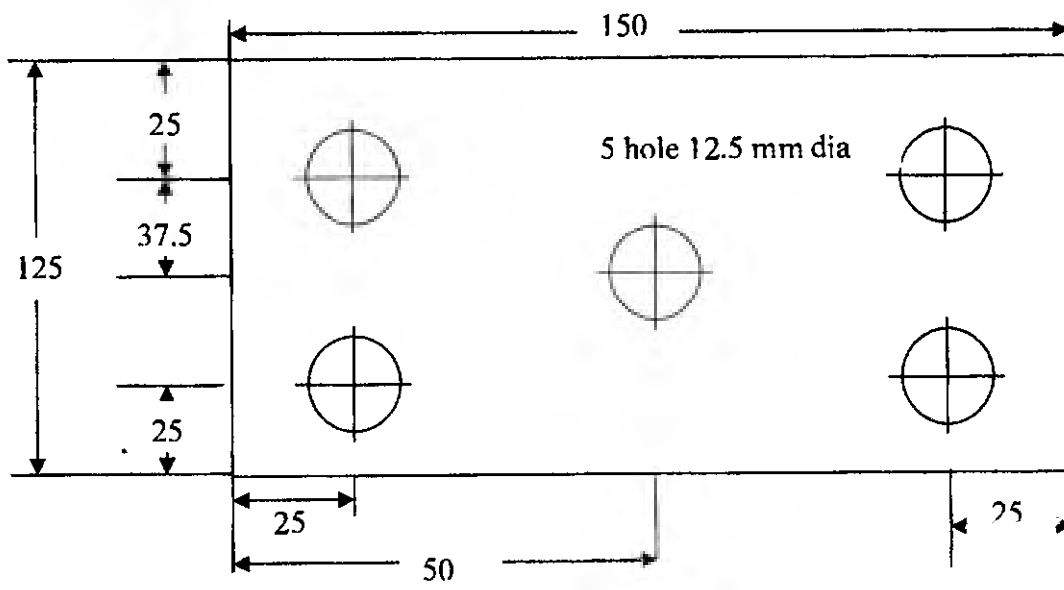


Figure no. 1

(b) Consider the Taper turning job in the figure no. 2 The raw material available is 20 mm bar. The operation involved are. Assume suitable data. [10]

- Facing
- Turn to 15 mm diameter over 15 mm length.
- Taper Turning

Write a CNC part program using G-Codes & M-Codes

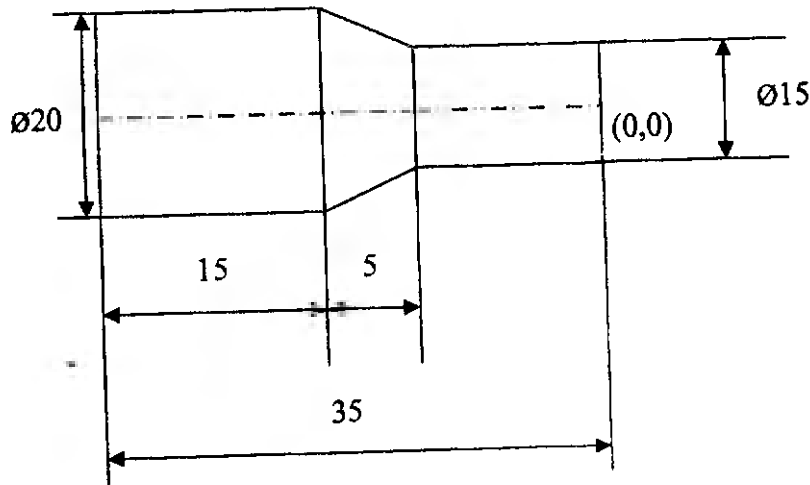
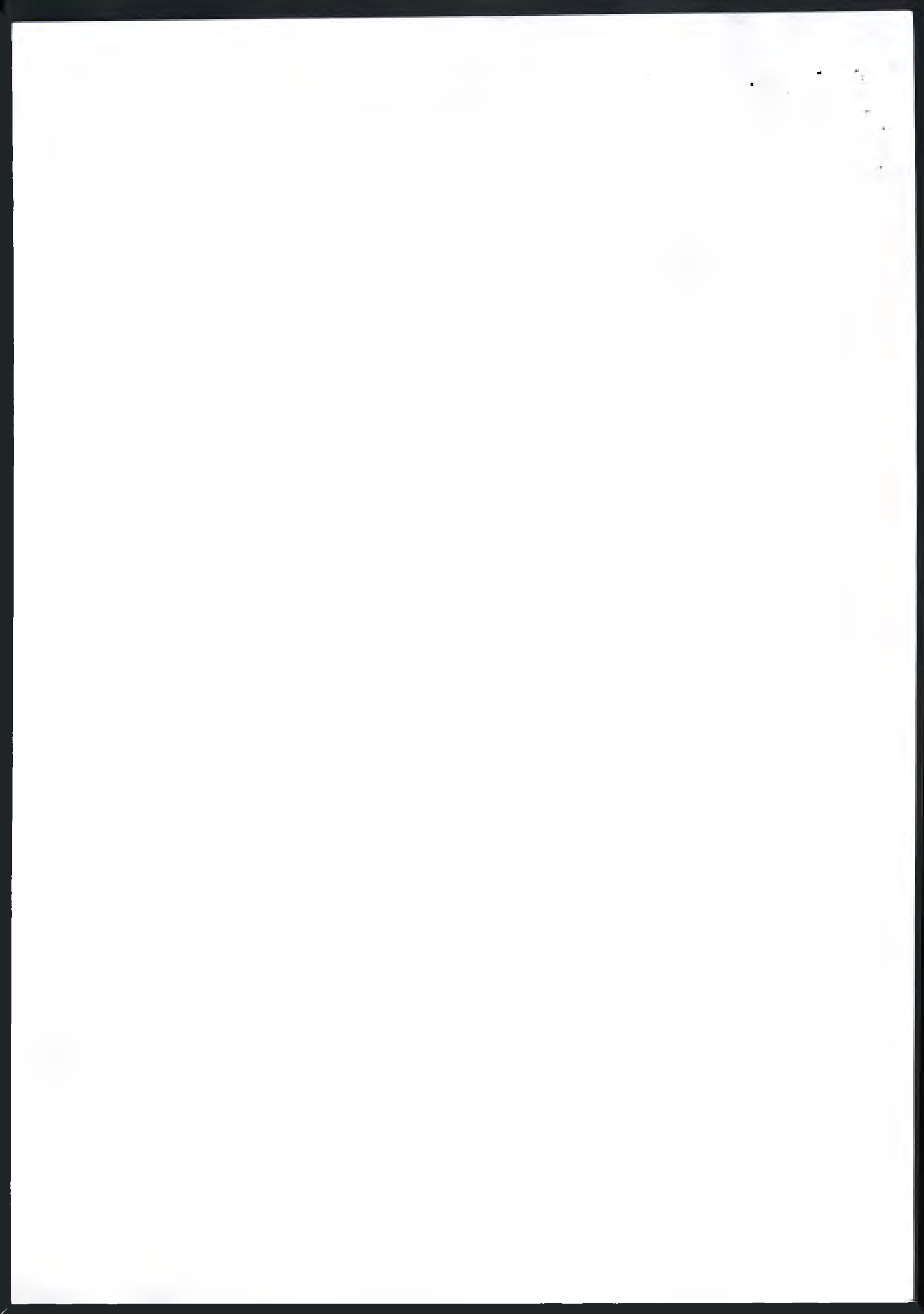


Figure no. 2

Q.7 Write Short notes on (Any four) [20]

- Rapid Prototyping Techniques
- Virtual Reality & Virtual Manufacturing
- Constructional details of CNC machines
- Computer Aided Process Planning
- Artificial Intelligence in Design
- Computer Integrated manufacturing
- Design for Assembly
- Structured Query Language (SQL)



BEC (Mech), Sem - VIII, 215115
Industrial Finance & Enterprise Resource
Planning...

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02-05-15

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SARDAR PATEL COLLEGE OF ENGINEERING

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Total marks : 100

May, 2015

CLASS/SEM : BE (Mech) / SEM- VIII

SUBJECT: IF ERP

- Question ONE is compulsory and solve any FOUR question out of remaining SIX.
- Assume suitable Data whenever necessary

Master

- Q.1 **Solve any Four** 20
- a) What is the present value of the following cash stream if the discount rate is 14 percent?
- | Year | 0 | 1 | 2 | 3 | 4 |
|-----------|------|------|------|------|------|
| Cash flow | 5000 | 6000 | 8000 | 9000 | 8000 |
- b) Discuss the problem associated with internal rate of return (IRR).
- c) What do the critics of the goal of maximizing shareholder wealth say? What is the rebuttal provided by the advocates of maximizing shareholder wealth?
- d) Explain TOP 11 CRM manufactures and their product name
- e) Discuss the ERP implementation challenges
- f) Explain the evolution of ERP system
- Q.2 a) Explain different forms of business organization with advantages and disadvantages. 10
- b) What happens if the compounding frequency is increased from annual to daily basis? How much is the increase in effective interest rate if we switch over from annual compounding to daily compounding? Explain by taking one example. 10
- Q.3 a) The following ratios are given for Mintex company. 12
- Net profit margin ratio = 4 percent
Current ratio = 1.25
Return on net worth = 15.23 percent
Total debt to total asset ratio = 0.40
Inventory turnover ratio = 25

[Please Turn Over]

Complete the following statements

Profit and Loss Account

| | |
|--------------------------------|-------|
| | Rs |
| Sales | ----- |
| Cost of goods sold | ----- |
| Operating expenses | 700 |
| Profit before interest and tax | ----- |
| Interest | 45 |
| Profit before tax | ----- |
| Tax provisions (50 percent) | ----- |
| Profit after tax | ----- |

Balance Sheet

| | | | |
|---|-------|----------------|-------|
| Net Worth | ----- | Fixed assets | ----- |
| Long-term debt (15 percent interest) | ----- | Current assets | 180 |
| Account payable | ----- | Cash | ----- |
| | | Receivables | 60 |
| | | Inventory | ----- |

- b) Explain cash flow statement in detail 4
- c) Explain different types of taxes. 4
- Q.4 a) Explain in detail three methods of discounting investment criteria. 12
- b) The expected cash flows of a project are as follows: 8

| Year | 0 | 1 | 2 | 3 | 4 | 5 |
|-----------|----------|--------|--------|--------|--------|--------|
| Cash Flow | -100,000 | 20,000 | 30,000 | 40,000 | 50,000 | 30,000 |

The cost of capital is 12 percent. Calculate the following: (i) net present value (ii) benefit-cost ratio, (iii) internal rate of return.

- Q.5 a) Explain the Major Components of ERP in Detail 10
- b) What are the main components of PLM & impact of Internal and External Factors on PLM 10
- Q.6 a) Explain WMS Benchmarking in detail and interaction with ERP 10
- b) Explain MES functions and relationship of MES with ERP 10
- Q.7 a) Discuss the Types Risks and Benefits i.e. Tangible and Intangible benefits of ERP in details 10
- b) Explain Production Module, Production Module features and sub module of production 10

BE (Mech), Sem - VIII, 515115
Elective - Automobile Engineering

4b
05/05/15

BHARATIYA VIDYA BHAVAN'S
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[An Autonomous Institution Affiliated to University of Mumbai]
END SEMESTER EXAMINATION, MAY 2015

SEM / CLASS: SEM VIII / B E. (MECH. ENGG.) TOTAL MARKS: 100

SUB: AUTOMOBILE ENGINEERING (ELECTIVE)

TIME: 03 HRS

Note: Question No. 1 is compulsory.

Attempt any Four questions out of remaining six questions.

Answers to all sub questions should be grouped together.

All questions carry equal marks.

Make suitable assumptions with proper explanations.

Master

Q. 1. Answer the following questions (any five)

(a) What are the materials used in cylinder block manufacture? Provide the composition of material with proper reason.

(b) What are the major functions of an automobile battery? Why is lead-acid battery suitable choice for an automobile even today?

(c) What are the considerations when designing a starting system? What is the principle of operation of a starter motor?

(d) How are the safety features for the occupants included in a car body against a collision? On what factors do automobile body shapes depend?

(e) What are the functions of suspension? What are the points in favour of front independent suspension?

(f) How are the moving parts of the gearbox lubricated? What is the function of the propeller shaft?

Q. 2. A) The coefficient of rolling resistance for a truck weighing 70000 N is 0.02 and coefficient of air resistance is 0.03 in the formula $R = K_w + K_a A V^2$, N, where A is in m^2 of frontal area and V the speed in km/hr. The transmission efficiency in top gear of 6.2:1 is 90% and that in the second gear of 15:1 is 80%. The frontal area is $6.2 m^2$. If the truck has to have a maximum speed of 100 km/hr in top gear, calculate:

1. The engine B.P required
2. The engine speed if the driving wheels have an effective diameter of 0.8 m
3. The maximum drawbar pull available on level at the above engine speed in second gear.

B) Give the constructional features of an Indian bus. Show by line diagram how the drive is taken from the engine to the driving wheels for front engine rear wheel drive arrangement. How do you provide all-round, forward and backward (rearward) visibility during design of Coach Buses?

Page 1

BEC Memu, Sem. ~~VIII~~, 5/5/15.

Elective - Automobile Engineering

Q. 3. A) Derive the equations for vertical reaction at front wheel (R_F) and rear wheel (R_{R1} and R_{R2}) of three wheeled vehicle at rest. Consider CG is at the center of axis of passenger car.

B) Explain the term rolling resistance. How is rolling resistance related to vehicle speed? What are the factors that affect rolling resistance? Explain the term gradability and draw bar pull.

Q. 4. A) What are the major functions of vehicle lights? -What is the characteristic of head light system? Why is shallow parabolic reflector used in vehicle head light system? What are the common faults with vehicle lighting system?

B) What are the factors, which decide the fuel tank design and capacity? How is fuel tank mounted? How is the CI engine fuel system different from that of the SI engine?

Q.5 A) What is the general classification of road vehicles? What are the differences between a coach and double-decker bus from utility point of view? What are the main parts of an automobile?

B) Name the instruments and indicators that are usually located in an instrumental panel. Explain briefly how power windows operate. What are power adjustable seats? What are the design considerations of a vehicle?

Q. 6.A) State the different types of services that can be performed on a vehicle and explain each in brief. According to the maintenance schedule, how frequently the following items would be given attention:

(a) Engine oil and filter (b) engine coolant change (c) battery (d) brake fluid change.

What type of inspection would be given to the wheels and tyres?

B) Name the main parts of a MPFI system. Name some of the sensors that provide input to the ECU and also state the functions of each sensor. Why does the system need a plenum chamber?

Q. 7. A) What are the tubeless tyres? What are the merits of tubeless tyre over tubed tyre? What is the difference between a bias tyre and a radial tyre? How do truck wheels differ from car wheels? How does the tyre help vehicle operation? What are the objectives the automobile wheels must fulfill?

B) What are the functions of a steering system? What are the three major parts of the steering column? How do steering gear ratio and number of turns determined? Why is a differential necessary? Explain the working principle of a differential.

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BE (Mech), Sem - VIII, Re-exam,

CAD / CAM / CIM

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18/06/15

SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks : 100

CLASS / SEM : B.E. (Mech) Sem- VIII Re-Exam Paper

Duration : 3 hrs

SUBJECT: CAD/CAM/CIM

- Q.no.1 is compulsory
- Attempt any four questions out of remaining 6
- Figures to the right indicate full marks
- Assume Suitable data wherever necessary

Master

- Q.1 (a)** Explain different types of Geometric Modeling techniques in detail along with neat sketches [10]
- (b)** Explain how Virtual Reality technology is useful in product development? Explain the hardware & software required for the VR technology? [10]
- Q.2 (a)** Explain Reverse Engineering in detail? Explain the data capture techniques used in RE along with neat sketches? List the softwares used for Reverse Engg [10]
- (b)** Find the Matrix for mirror reflection with respect to the plane passing through the origin and having a normal vector whose direction is $M = I + J + K$ [08]
- (c)** Differentiate between CSG & B-Rep. [02]
- Q.3 (a)** Develop a C++ program to carry out following transformations on a 2D object like line. Insert necessary comments wherever necessary. [20]
- 1) Shear
 - 2) Reflection
 - 3) Rotation
- Q.4 (a)** Write Short notes on (Any Three) [20]
- i. Computer Aided Process Planning (CAPP)
 - ii. Circle Algorithm
 - iii. Group Technology (GT)
 - iv. Product Life Cycle Management (PLM)
 - v. Concurrent Engineering (CE)
 - vi. Rapid Prototyping Techniques (RPT)

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Q.5 (a) Explain the following APT statements along with their syntax & example [10]

- Geometry Statements
- Motion Statements
- Auxiliary Statements
- Post Processor Statements

(b) Explain Flexible Manufacturing System along with neat sketches, advantages, Disadvantages [10]

Q.6 (a) Explain the following [10]

- DDA line Algorithm
- Artificial intelligence in Design

(b) Assume a component of your choice and write a CNC program using G codes & M codes. Assume suitable data for the program. [10]

Q.7 (a) Triangle PQR has vertices as P (2, 4), Q (4, 6), and R (2, 6). It is desired to reflect through an arbitrary line L whose equation is $Y=0.5x+2$. Calculate the new vertices of triangle and show the results graphically. [10]

(b) Explain the following (Any two) [10]

- Graphics Standards
- Bspline Curves
- Sutherland Hodgeman Algorithm
- Computer Integrated Manufacturing (CIM)