



Bharatiya Vidya Bhavan's  
**Sardar Patel College of Engineering**

(A Government Aided Autonomous Institute)  
Munshi Nagar, Andheri (West), Mumbai – 400058.  
End Semester Exam  
May 2016



Max. Marks:100  
Class: B.Tech(Mechanical)  
Program: MECHANICAL ENGINEERING  
Name of the Course: AUTOMOBILE ENGINEERING  
Course Code : ME 458

Duration: 3HR  
Semester:VIII

Master file.

**Instructions:**

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1	(A) A motor car has a wheel base of 2.743m and pivot centres 1.065m apart. The front and rear wheel track is 1.217m. Calculate the correct angle of outside lock and turning circle radius of the outer front and inner rear wheels when the angle of inside lock is $40^\circ$ .	10	1	2
	(B) Explain in details the working of ECM in vehicle. Also explain open loop and close loop system of ECM in vehicle with suitable example	10	2	6
Q2	(A) Derive an expression for power required for the vehicle.	08	1	1
	(B) Explain with neat sketch Excellence of Tubeless Tyre over Tube Tyre.	06	2	3
	(C) Describe Different types of engines used in automobiles. Write down materials used for manufacturing of cylinder block with material properties required for it.	06	3	1
Q3	(A) State type of independent suspension system. Describe construction and working of wishbone suspension system. Also describe objective of suspension system.	10	3	2
	(B) Differentiate between single point and multipoint injection system. And explain working of VFIS in details with neat sketch.	10	3	7

Q4	(A) State type of electronics ignition system. Describe ignition system that uses Silicon Controlled Rectifier (SCR), in details.	10	1	3
	(B) Explain the mechanism of valve train with suitable diagram.	05	3	01
	(C) What types of headlamp used in automobile? Describe construction and working of Sealed-Beam Headlights.	05	3	3
Q5.	(A) Explain with sketch the importance of driver's seat. What are the basic parameters involved in design of driver seat.	10	1	4
	(B) Name the different devices used for reduction of aerodynamic drag and explain them in details.	10	1	04
Q6	(A) With neat sketch explain the two type of window regulator and describe how power window regulator working.	10	2	5
	(B) Explain the various sources of vibration in vehicle and steps taken to minimize these vibrations. What is its effect on comforts human body?	10	1	5
Q7	(A) Explain in details the position and working of following 1) Lambda sensor 2) Knock sensor 3) flow sensor 4) Magnetic Sensors 5) Throttle potentiometer sensor	10	2	7
.	(B) Explain types of maintenance in vehicle. Suppose your car battery is dead somewhere in Mumbai-Pune Expressway and there is no garage then how you start your car explain in details.	10	2	6



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May 2016



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**Max. Marks:** 100

**Class:** B. Tech

**Name of the Course:** IFERP

**Semester:** VIII

**Duration:** 3 Hr.

**Program:** Mechanical Engineering

**Course Code :** ME403

**Instructions:**

*Master file.*

1. Attempt any Five Questions.
2. Figures to the right indicate full marks
3. Draw the flow chart/diagram wherever necessary

Question No		Max. Marks	Course Outcome Number	Module No.																				
Q1	Following data relate to five independent investment projects :	20	2	4																				
	<table border="1"><thead><tr><th>Projects</th><th>Initial Outlay</th><th>Annual Cash Inflows</th><th>Life in Years</th></tr></thead><tbody><tr><td>P</td><td>10,00,000</td><td>2,50,000</td><td>8</td></tr><tr><td>Q</td><td>2,40,000</td><td>24,000</td><td>15</td></tr><tr><td>R</td><td>1,84,000</td><td>30,000</td><td>20</td></tr><tr><td>S</td><td>11,500</td><td>4,000</td><td>5</td></tr><tr><td>T</td><td>80,000</td><td>12,000</td><td>10</td></tr></tbody></table>				Projects	Initial Outlay	Annual Cash Inflows	Life in Years	P	10,00,000	2,50,000	8	Q	2,40,000	24,000	15	R	1,84,000	30,000	20	S	11,500	4,000	5
Projects	Initial Outlay	Annual Cash Inflows	Life in Years																					
P	10,00,000	2,50,000	8																					
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R	1,84,000	30,000	20																					
S	11,500	4,000	5																					
T	80,000	12,000	10																					
Q2	A) M/s. Pandey Ltd. is contemplating to purchase a machine A and B each costing of Rs.5,00,000. Profits before depreciation are expected as follows :	10	2	4																				

Year	Cash Inflows		Discounted Factor 10%
	Machine A Rs	Machine B Rs	
1	1,50,000	50,000	0.9092
2	2,00,000	1,50,000	0.8264
3	2,50,000	2,00,000	0.7513
4	1,50,000	3,00,000	0.6830
5	1,00,000	2,00,000	0.6209

Using a 10% discounted rate indicate which of the machine would be profitable using the Net Present Value (NPV) method.

State and explain Equation for Calculating Net Present Value and rules of acceptance of any project based on NPV along with advantages and disadvantages

**B)** Explain in detail the following terms

- i. COGS
- ii. SG & A
- iii. Partnership
- iv. Balance sheet Vs Income Statement

10

2,3

1,2,3

**A)** Explain in detail the various cost involved while implementing ERP system.

5

1,2

6

**B)** You have just purchased an investment property for \$400,000. You expect the value of the Property to increase at an annual compound interest rate of 8% over the next 10 years. How much do you expect the property to be worth after 10 years?

5

2,3

3

**Q3**

**C)** With the help of following numerical explain what are the ways to calculate future value and compounding along with formulas

- 1) \$1000 invested for five years with simple annual interest of 10% would have a future value of \$ \_\_\_\_\_
- 2) \$1000 invested for five years at 10%, compounded annually has a future value of \$ \_\_\_\_\_

5

2,3

3

**D)** How to calculate present value of uneven cash flow? suppose that an investor has determined the expected future cash flow of and asset will follows as given

5

2,3

3

	<p>Time 0 : \$5000  Time 1 : \$2000  Time 2 : \$500  Time 3 : \$10000  Calculate the present value of the cash flow at 8%</p>			
Q4	<p>A) A project costs Rs. 5, 00,000 and has a scrap value of 1, 00,000 after 5 years. The net profit before depreciation and taxes for the five years period are expected to be Rs. 1, 00,000. Rs. 1, 20,000. Rs. 1.40,000, Rs. 1, 60,000 and Rs. 2.00,000. You are required to calculate the Accounting Rate of Return, assuming 50% rate of tax and depreciation on straight line method.</p>	10	2	4
	<p>B) Explain some positive and negative experience with ERP.</p>	10	1,2	5
Q5	<p>A) How ERP and CRM integration gives strength to your business.</p>	10	1,2	6
	<p>B) What is PLM? How ERP and PLM fits together? What are the risks and problems arises in implementing ERP without PLM?</p>	10	1,2	6
Q6	<p>A) List and explain different modules of ERP.</p>	10	1,2	5
	<p>B) Explain in detail ERP implementation life cycle.</p>	10	1,2	7
Q7	<p>A) What are the different challenges faced while implementing ERP? Explain the process of ERP auditing.</p>	10	1,2	5,7
	<p>B) Explain in detail quantifiable benefits of ERP</p>	10	1,2	7





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**End Semester Exam**  
 May 2016

Max. Marks. 100

Duration: 4 Hours

Class: Final Year B.Tech. Semester: VIII Program: B.Tech. in Mechanical Engineering

Name of the Course: Design of Mechanical Systems

Course Code: ME451

**Instructions:**

*Master file.*

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

	Max. marks	CO No.	Module No.
Q1 a) You are joining as a design engineer in an organization manufacturing coal crushing ball-mills. Apply your knowledge of mechanical system design and propose procedural steps to develop design of the ball-mill.	(4)	1	all
b) A belt conveyor system is required to be designed to transfer wet clay in a brick manufacturing company. Prescribe specific sub-system/s which need/s to be properly selected to suit the material being handled. Propose different options available to the designer to select this sub-system/s.	(4)	2,3	3
c) Give classification of pumps employed in engineering industry. Select type of pump for following applications: (i) pharmaceutical liquid solution, (ii) paint, (iii) household sewage, (iv) crude from oil well platform. Justify your selection.	(4)	2	4,5
d) Draw sketch of an internal gear pump and describe its working.	(4)	3	6
e) Give classification of pressure vessels in terms of their geometry, function and service. How will you determine joint efficiency of welds for a pressure vessel?	(4)	1,2	7
Q2 a) Explain the material handling equation. Apply the equation to develop material handling system (type as well as features) for transfer of following materials: (i) LED television screens, (ii) nuclear waste and (iii) fully assembled car engine.	(5)	1,3	1
b) Design a 22° troughing belt conveyor to transfer 70 tons/hour of gypsum through a horizontal distance of 150 m and vertical height of 22 m. The belt speed is to be limited to 1.5 m/s. 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)	1	3
(i) Belt width.			
(ii) Calculation of belt resistances and belt-tension.			
(iii) Selection of belt fabric.			

- Q3 a) Following specification refers to an EOT crane.
- Class of mechanism = M5 (equivalent to old-standard class II)
  - Hook load = 65 kN
  - Height to which load is raised = 7 m
  - Dead weight of hoisting system = 4 kN
  - Braking time for hoist = 1.5 seconds
  - Hoisting velocity = 16 m/min
  - Number of rope falls = 4
  - Weight of trolley = 4 kN
  - Speed of trolley = 20 m/min
  - Trolley wheel and wheel-axle diameters = 225 and 50 mm

(i) Select suitable size of rope. (ii) Calculate size of torque rating of hoisting brake. (iii) Calculate power rating of electric motor to drive trolley.

- b) Explain different types of wear rings employed in centrifugal pumps with neat sketches. Suggest a wear ring type to achieve maximum hydrodynamic efficiency of the pump. (5) 2,3 4,5

- Q4 a) Describe different types of industrial material handling systems. Discuss typical features of each type with suitable example. (5) 2,3 1

- b) Design a gear pump to deliver lubrication oil at discharge rate of 125 liters/minute. The delivery pressure is 32 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) 1 6

- Q5 a) A centrifugal pump is to be designed to generate total head of 52 meters; the medium is water at 21°C and discharge rate is 85 m<sup>3</sup>/hr. Determine power requirement for the electric motor. Calculate the suction pipe diameter, impeller dimensions and number of vanes. Comment on design features of impeller which are critical from manufacturing perspective. (15) 1 5

- b) Define following terms used in pressure vessel design: (i) Design pressure, (ii) MDMT, (iii) MAWP, (iv) Pressure-temperature rating. How will you decide value of release pressure of the safety relief valve of a pressure vessel? (5) 1,3 7

- Q6 a) A vertical separator vessel of welded construction has following design specification. (15) 1,3 7

Inside diameter = 1450 mm	Material = carbon steel
Straight length of shell = 18,000 mm	Liquid level = 6,000 mm from bottom head to shell weld joint
Type of heads = 2:1 ellipsoidal	Liquid specific gravity = 1.5
Design internal pressure = 1.8 MPa	Allowable stress = 210 MPa
Design temperature = 125° C	Corrosion allowance = 2 mm
Joint efficiency = 0.85	Hydrotest pressure = nil



Calculate: (i) Thickness of shell, (ii) thickness of top and bottom heads, (iii) suitable schedule for 600 mm nominal size nozzle pipe for the vessel (consider nozzle location corresponding to the most conservative design of nozzle pipe), (iv) MAWP of vessel based on provided thickness of shell, heads and nozzle pipe.

- b) Describe with a neat sketch, construction of belt used for conveyor systems. (5) 3 3  
How belts are designated as per Indian standards?
- Q7 a) Explain difference between simple and multiple pulley systems. Which type is used in EOT cranes and why? (4) 2,3 1
- b) List different types of loadings considered in design of EOT crane. How class of mechanism is selected during design of EOT crane? Which loadings are affected by the mechanism class? (4) 2,3 2
- c) Describe with appropriate sketch, the procedures used to determine profile of vanes in centrifugal pump. (4) 1 5
- d) Write a short note on vane pump. Support your answer with a neat sketch. (4) 3 4
- e) Decide pressure temperature rating class for the flanges of the vessel specified in Question 6(a). (4) 1,3 7
- What is significance of nozzle reinforcement calculations in pressure vessel design? Explain the design procedure to calculate reinforcement requirement for nozzle connection in pressure vessel.

#### 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  $N/m^2 = 0.613V^2$ , where V is wind velocity in m/s.**Pressure temperature rating class for flanges (Carbon steel)**

Class Temp., °C	Working Pressure by Classes, bar						
	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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 May 2016



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Max. Marks: 100

Class: B.Tech.

Name of the Course: CAD/CAM/CIM

Semester: VIII

Duration: 3 hr

Program: B.Tech (Mech.)

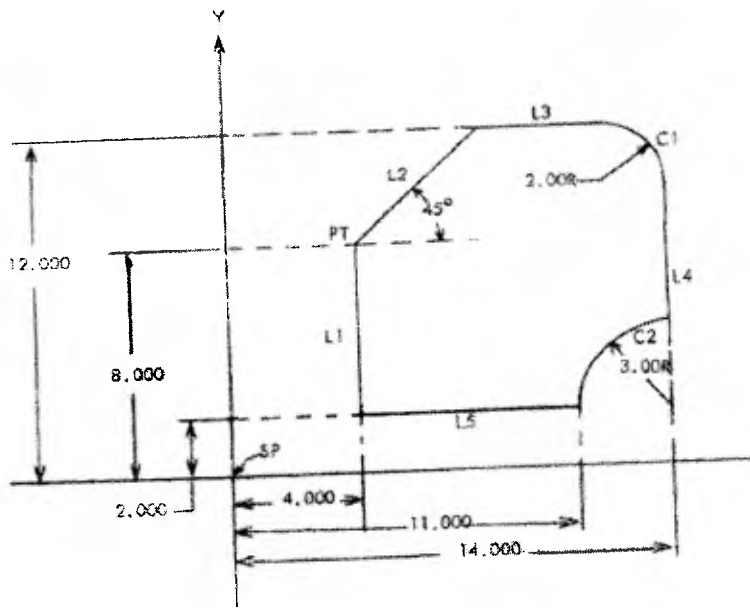
Course Code : ME452

**Instructions:**

1. Q.1 is compulsory
2. Solve any four questions out of remaining six
3. Figures to the right indicates full marks
4. Assume suitable data if necessary

*Master file.*

Question No		Maximum Marks	Course Outcome Number	Module No.
Q1	a) Construct a B-Spline curve of order 4 and with 4 polygon vertices A (1,1), B(2,3), C(4,3) and D(6,2)	[12]	03	02
	b) Write a C++ program for Bresenhams Circle Algorithm using Class & Object	[08]	04	01
Q2	(a) Consider a pyramid defined with coordinates A(0,0,0),B(1,0,0),C(0,1,0) and D(0,0,1). This pyramid is rotated by 45 degree about an axis, which is represented by a vector $V=I+J+K$ . Find the coordinates of the rotated figure.	[10]	03	05
	(b) Write a complete 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.	[10]	02	04



**Figure no.1**

(a) Develop a C++ program in terms of class & Object to carry out given transformations on a 2D object like line. Insert necessary comments wherever necessary.

- |            |   |      |    |    |
|------------|---|------|----|----|
| <b>Q3</b>  | 1) Shear<br>2) Rotation<br>3) Reflection<br>4) Translation  | [20] | 04 | 05 |
| <b>Q4</b>  | (a) Explain Reverse Engg. & data capture techniques along with neat sketches  | [10] | 01 | 07 |
|            | (b) Explain significance & concept of CAD-VR Integration with diagrams  | [05] | 01 | 07 |
|            | (c) Explain Significance of Object Oriented databases with example  | [05] | 01 | 05 |
| <b>Q.5</b> | (a) Explain the concept of Design for Assembly (DFA) along with neat sketches?  | [08] | 01 | 07 |
|            | (b) A rectangle ABCD is represented by vertices A (20,20), B(106.603, 70), C(81.603, 113.301), D(-5, 63.301) the rectangle is rotated by 30 degree clockwise about the vertex A. Determine the new vertex positions A', B', C' and D'. The transformed rectangle is then to be mirrored about a line joining the diagonal vertices A' & C'. Determine the new vertices of the triangle. | [12] | 03 | 05 |

Q.6 (a) Explain the concept of Knowledge Based Engineering (KBE) with neat figures? [10] 01 07

(b) The part drawing of the component is shown in figure no.2 Five holes of 12.5 mm diameter are to be drilled at five places. The speed & feed rate are 592 rpm & 100mm/min, respectively. The machine has a floating zero feature & absolute positioning. The thickness of the plate is 10 mm. Write a part program using G-Codes & M-Codes [10] 02 04

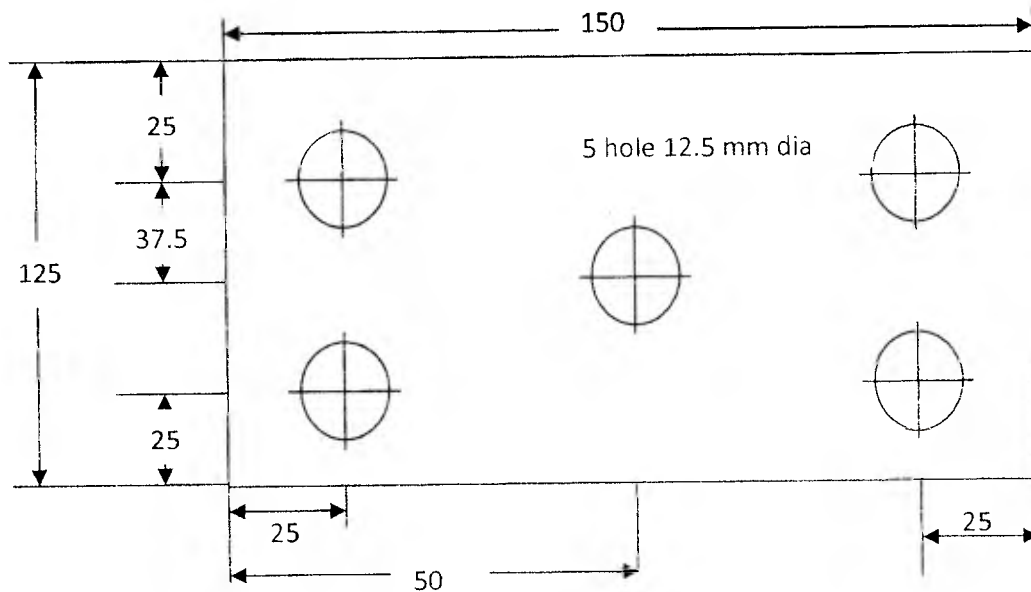


Figure no.2

Write Short notes on (Any Three)

Q.7

- Virtual Manufacturing (VM)
- Group Technology (GT)
- Computer Integrated Manufacturing (CIM)
- Adaptive Control
- Structured Query Language (SQL)
- Computer Aided Quality Control (CAQC)

[20] 01 3,4,5,6





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End Semester Exam  
May 2016



*lib sem*  
*10/5/2016*

Max. Marks: 100  
Class: BE(Mechanical)  
Subject- Supply Chain Management  
Course Code : ME457

Duration: 3 hrs  
Program: Mechanical Engineering  
Semester: VIII

*Master file.*

**Instructions:**

Attempt any 5 full Questions  
Figures to the right indicate full marks  
Draw suitable diagrams to illustrate your answers

Question No		Maximum Marks	Course Outcome Number	Module No.																					
Q1)	a) What do you mean by Supply Chain Management? State the various definitions given by different authors? What are the decision phases in supply chain? Give an example of supply chain?	10	1	1																					
	b) What are the various Design options for Distribution Network? Explain with suitable diagrams?	10	1	1																					
Q2	a) Distinguish between I. Push view and pull view in supply chain II. Forward and reverse logistics	10																							
	b) A firm uses simple exponential smoothing with $\alpha = 0.1$ to forecast demand. The forecast for the week of January 1 was 500 units whereas the actual demand turned out to be 450 units. Calculate the demand forecast for the week of January 8.	5																							
	c) Given the forecast demand and actual demand for 10-foot fishing boats. Calculate MAD.	5	1	2																					
	<table border="1"><thead><tr><th>Year</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th></tr></thead><tbody><tr><td>Forecast</td><td>78</td><td>75</td><td>83</td><td>84</td><td>88</td><td>85</td></tr><tr><td>Actual</td><td>71</td><td>80</td><td>101</td><td>84</td><td>60</td><td>73</td></tr></tbody></table>	Year	1	2	3	4	5	6	Forecast	78	75	83	84	88	85	Actual	71	80	101	84	60	73			
Year	1	2	3	4	5	6																			
Forecast	78	75	83	84	88	85																			
Actual	71	80	101	84	60	73																			

Q3	a) Explain scope and importance of Material Management? Why material management is necessary? Give classification of materials with suitable example?	10	2	3
	b) State and explain the feature vendor development and evaluation?	10	1	3
Q4	Write a short note on a) ABC analysis in inventory management b) TPL (Third Party Logistics) c) Reverse logistics d) Collaborative Planning Forecasting and Replenishment(CPFR)	20	1,2	3,4,5
Q5)	a) What do you mean by supply chain metrics? What are the Key supply chains Metrics?	10	2	7
	b) What do you mean by Warehouse? State the factors affecting location of warehouse? What are the benefits of Warehousing?	10	3	5
Q6)	a) Explain the SCOR model in detail	10	2	7
	b) Explain is Bullwhip effect and how does it relate to lack of co-ordination in the supply chain? State the various Obstacles to Coordination?	10	3	6
Q7)	a) Discuss the transportation in SCM? Explain Various modes of transportation?	10	2	5
	b) Explain in details the role of IT in Supply chain management?	10	1	6