13/05/19 Lab

1:30

BharatiyaVidyaBhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam

May 2019

Q. P. Code:

Max. Marks: 100 Duration: 03 hr

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

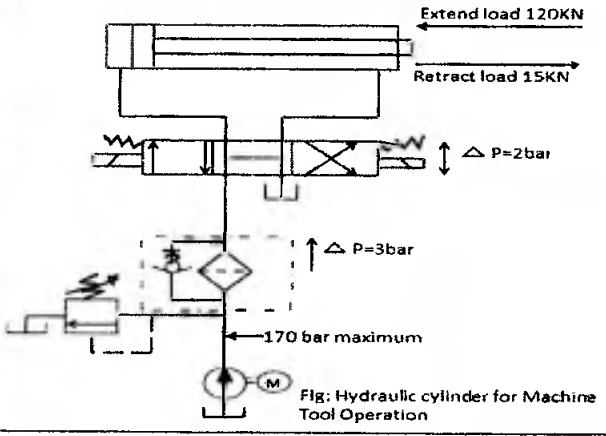
Name of the Course: Design of Mechanical Systems Course Code : PCC-BTM801

Instructions:

1. Attempt any five questions.
2. Answer to all sub questions should be grouped together.
3. Assume suitable data if necessary and justify the same
4. Use of PSG data book is permitted. Refer Annexure 1 for additional design data.

Question No		Maximum Marks	Course Outcome Number	Module No
Q1 (a)	Write the material code for pulverized alum and granular aluminum sulphate with their material properties.	4	1, 2	1
(b)	Discuss Angle of surcharge and Angle of repose	4	1, 2	1
(c)	Recite the following terms: 1. Drive unit used for belt conveyors 2. Different resisting forces acting on the Conveyer belt	4	1	3
(d)	Explain with sketch the working of diaphragm pump. State typical applications of the diaphragm pump.	4	1, 2	5
(e)	Classify pressure vessels in terms of their geometry, function and service.	4	1	7
Q2 (a)	Following specification refers to an EOT crane: ▪ Class of mechanism = M7 (equivalent to old-standard class III) ▪ Hook load = 95 kN ▪ Height to which load is raised = 9 m ▪ Dead weight of hoisting system = 6 kN ▪ Hoisting velocity = 15 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) Design rope drum, (iii) Calculate power rating of electric motor to drive trolley.	15	1, 2	2
Q2 (b)	Differentiate between the single and multiple pulley systems. Which type is used in EOT cranes and why?	5	1, 3	2
Q3 (a)	Recite the following terms: 1. Drive unit used for belt conveyors	5	1, 4	3

	2. Different resisting forces acting on the Conveyer belt			
(b)	Prepare design of a 23° troughing belt conveyor to transfer 120 tons/hour of dry sand through a horizontal distance of 120 m and vertical height of 15 m. 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. (i) Belt width. (ii) Calculation of belt resistances and belt-tension. (iii) Selection of belt fabric.	15	2	3
Q4 (a)	1. List the factors influencing screw conveyor design 2. Sketch external and internal gear pumps and describe it's working.	05	1, 4	4
(b)	Design a screw conveyor to convey the drilling sludge along 1.6m conveying length having the bulk density as 1.6 tonne/cu.m at an inclination of 10^0. Determine the power requirement of the screw feeder. Also suggest the recommended specifications for a standard screw conveyor in the sketch.	15	1, 2	4
Q5 (a)	I. Explain the purpose of provided vanes on the impeller II. On which factors flowrate is dependent? III. Explain the following terms: 1. Cavitation 2. Leakage	06	1, 2	5
(b)	A centrifugal pump is to be designed to generate total head of 55 meters, The medium is water at 20^0 and discharge rate is 90 m^3/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.	14	1, 2	5
Q6 (a)	A hydraulic cylinder as shown in figure for a machine tool application has to exert a forward thrust of 120 KN and a reverse thrust of 15 KN. The retract speed should be approximately 5 m/min utilizing full pump flow. Assume that the maximum pump pressure is 170 bar and pressure drops over the following components and their associated pipe works (where they are used). Filter = 3 bar Directional valve (each flow path) = 2 bar Determine: (a) The cylinder size (assume 2:1 ratio piston area to piston rod area) (b) Pump Size (c) Circuit efficiency	12	3, 4	6

	 Fig: Hydraulic cylinder for Machine Tool Operation			
(b)	A hydraulic pump for a machine tool application is having a displacement of 14 cm^3/rev is driven at 1440 rpm and operates against a maximum pressure of 150 bar. The volumetric efficiency is 0.90 and the overall efficiency is 0.80. Calculate: (a) The pump delivery is litres/min (b) The input power required at the pump shaft in kilowatts (c) The drive torque at the pump shaft.	08	1, 4	6
Q7 (a)	(a) Explain welded joints in pressure vessels along with diagram. (b) Identify the uses of gaskets and gasketed joints in pressure vessel. (c) What are the end enclosures and openings in pressure vessel?	12	1, 3	7
(b)	A pressure vessel consists of a cylindrical shell of inside diameter 1650 mm, which is closed by torispherical heads with a crown radius of 1300 mm. The operating pressure inside the vessel is 1.5 MPa. The yield strength for the material used for the shell and head is 255 N/mm^2 and the weld joint efficiency may be assumed to be 0.8. The corrosion allowance is 2 mm. Determine the thickness of the cylindrical shell and the torispherical head.	08	1, 3	7

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:

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

where $Q' =$ (leakage factor) $\times Q$, $\quad V_s = V_0 = V\epsilon$, $\quad V = \sqrt{2gH}$, $\quad \epsilon = 0.023\sqrt{n_q}$

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

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

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

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

Screw Conveyor

Nominal Screw diameter Size, D: 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000, 1250 mm.

Pitch Screw of the screw, s in mm

S : 80, 100, 125, 160, 200, 250, 315, 400, 500, 560, 630, 800, 1000

Outside Diameter of the shaft, d1

Solid type	25,	30,	35,	40,	50,	60,	70,	80,	90,	100,	110,	125 mm
Tabular type	33·7, 133,	42·4, 139·7,	48·3, 152·4,	57, 159,	60·3, 193·7mm		76·1,	88·9,		100,	114·3,	

Height, a

Nominal Size, mm	100	125	160	200	250	315	400	500	630	800	1000	1250
Height a, mm	63	75	80	112	140	180	224	280	355	450	560	710

Recommended dimensions of trough and screw for screw conveyors:

Nom Size D	Trough Height from Centre of Screw Shaft to Upper Edge of the Trough s	Trough Width c	Thickness of Trough			Tabular Shaft d_1 × Thickness	Outside Diameter of Solid Shaft	Coupling Shaft Diameter	Nominal Thickness of Helical Screws					
			Heavy Duty	Medium Duty	Light Duty				Segmental root			Continuous root		
									Heavy	Medium	Light	Heavy	Medium	Light
100	63	170	—	2·0	1·6	33·7 × 2·5	30	35	—	3·15	2·0		5·0	3·15
125	75	185	—	2·0	1·6	33·7 × 2·5	30	35	—	3·15	2·0	—	5·0	3·15
160	90	216	5·0	3·15	1·6	42·4 × 2·5	35	40	5·0	3·15	2·0	7·0	5·0	3·15
200	112	220	5·0	3·15	2·0	48·3 × 3·5	40	45	5·0	3·15	2·0	7·5	5·0	3·15
250	140	270	5·0	3·15	2·0	60·3 × 4·0	55	50	6·0	5·0	3·15	10·0	7·0	5·0
315	180	325	5·0	3·15	—	76·1 × 5·0	60	55	7·0	5·0	3·15	10·0	7·0	5·0
400	224	420	5·0	3·15	—	76·1 × 5·0	65	75	8·0	6·0	5·0	12·0	10·0	7·0
500	280	520	5·0	3·15	—	88·9 × 5·0	70	75	8·0	6·0	5·0	12·0	10·0	7·0
630	355	650	5·0	3·15	—	88·9 × 5·0	70	75	8·0	7·0	5·0	—	—	—
800	450	830	6·0	5·0	—	114·3 × 5·0	80	75	8·0	7·0	5·0	—	—	
1000	560	1030	6·0	5·0	—	114·3 × 5·0	80	100	10·0	8·0	—	—	—	—
1250	710	1290	7·0	5·0	—	139·7 × 6·0	90	120	10·0	8·0	—	—	—	—
1400	800	1450	8·0	5·0	—	139·7 × 6·0	90	100	10·0	8·0	—	—	—	—
1600	900	1650	8·0	5·0	—	139·7 × 6·0	90	100	10·0	8·0	—	—	—	—
1800	1000	1850	8·0	5·0	—	152·4 × 7·0	100	125	12·0	10·0	—	—	—	—
2000	1120	2050	7·0	5·0	—	152·4 × 7·0	100	125	12·0	10·0	—	—	—	—
2240	1250	2290	7·0	5·0	—	193·7 × 8·0	110	125	12·0	10·0	—	—	—	—
2500	1400	2550	7·0	5·0	—	193·7 × 8·0	110	150	12·0	10·0	—	—	—	—

Note 1 — In case of continuous helical screw tip thickness shall be as agreed between purchaser and manufacturer.

Note 2 — The values for tubular shaft & diameter 42 has been taken preferably from IS : 3601-1966.

15/5/19. Lab [1:30]

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SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

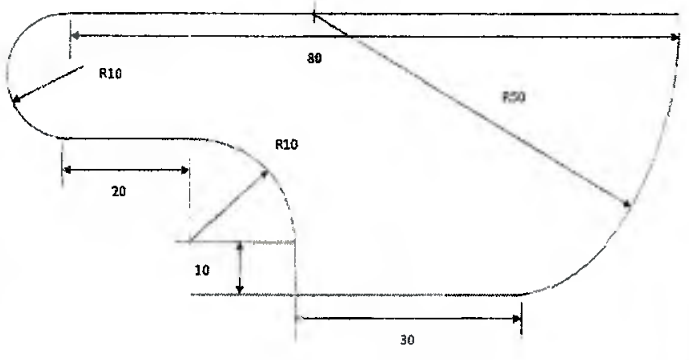
May-June 2019 Endsem Examinations

Program: B.Tech.(Mechanical)
Course Code: PCC-BTM802
Course Name: CAD/CAM/CIM

Duration: 3hrs
Maximum Points: 100
Semester: VIII

1. Solve any five questions out of seven
2. Figures to the right indicates full marks
3. Assume suitable data wherever necessary

Q.No.	Questions	Points	CO	BL	PI
Q.1 (A)	Explain Adaptive Control machining system with figure? Also explain the types of Adaptive Control with neat figures?	10	1	3	5.2.1
(B)	• Explain Thread cycle cutting in CNC with neat sketch? Also write & explain its G-code format • Explain Tool length compensation with its figure? Also write & explain its G-code format?	10	1	3	5.2.1
Q.2 (A)	Write a C++ program for the following 2D transformation 1] Rotation 2] Reflection 3] Shearing using class and object for an 2D object like line. Insert necessary comments wherever necessary.	15	2,3	4	5.2.1
(B)	Explain the Principle & Working of Velocity feedback of closed loop systems used in CNC machines with neat figures?	05	1,3	4	1.1.1
Q.3 (A)	• A cubic spline curve is defined by the equation $P(u)= C_3 u^3 + C_2 u^2 + C_1 u + C_0, \quad 0 < u < 1$ Where C3, C2, C_1 and C_0 are the polynomial coefficients. Assuming these coefficients are known, find the four control points that define an identical Bezier curve in terms of these polynomial coefficients • Write a short note on Data Structures for interactive Modeling.	10	2,1	3	1.1.1
(B)	A cube defined by 8 vertices A(0,0,0) B(2,0,0) C(2,2,0) D(0,2,0) E(0,0,2) F(2,0,2) G(2,2,2) H(0,2,2).Find the final coordinates after it is rotated by 45degree around a line joining the points (2,0,0) and (0,2,2) **OR** What is Feature Recognition? What are the different methods of feature Recognition? Explain the graph based approach method of feature recognition in detail with an example?	10	2,3	4	1.1.1, 5.2.1
Q.4 (A)	• Explain Gouraud Shading Algorithm with net figures • Explain Artificial Intelligence in Design with neat figure	10	1	3	5.2.1

(B)	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	2	3	5.2.1
Q.5 (A)	Construct a B-Spline curve of order 4 and with 4 polygon vertices using open uniform vector A (1,1), B(2,3), C(4,3) and D(6,2)	10	3	4	1.1.1
(B)	How the line between (2,2) & (12,9) is clipped against a window with (X_{wmin}, Y_{wmin}) = (4,4) and (X_{wmax}, Y_{wma}x) = (9,8) using Cohen Sutherland Algorithm	05	3	4	1.1.1
(C)	Write a APT part program for the following path to be traversed by the cutter shown in figure no -1 	05	3	3	1.1.1
Q.6 (A)	• Write a C++ Program for the Bresenhams Circle Algorithm using Class & Object. • What are Object Oriented Databases? How they are used in the field of Mechanical Enginering?	10	1,2,3	4	5.2.1, 1.1.1
(B)	A rectangle ABCD has vertices A(10,20), B(40,20), C(40,40) & D(10,40). This rectangle is to be sheared in such a way that coordinates of vertices C & D change to C'(50,40) and D'(20,40), with A & B remaining unchanged. Write the necessary transformations & find the final coordinates of rectangle	10	2	4	5.2.1
Q.7	Write Short notes on (Any Three) • Computer Aided Process Planning (CAPP) • Computer Aided Quality Control (CAQC) • Structured Query Language (SQL) • Engineering Database Mgt. Systems (EDMS) • Concurrent Engineering (CE) • Augmented Reality & its applications • Group Technology (GT)	20	1	3	5.2.1

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Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058

END SEM EXAMINATION

Program: **B. Tech. in Mechanical Engineering**
Class: **Final Year B. Tech. (Mechanical)**
Course code: PCC-**BTM 803**
Course: **Industrial Management, Enterpreneurship & ERP**

Date: **May-2019**
Duration: **3 Hr.**
Max. Points: **100**
Semester: **VIII**

Instructions:

- Attempt **ANY 05** questions.
- Draw neat diagram /Sketch/Block Diagram wherever necessary.
- Use **Graph paper** for drwaing Break-Even Chart
- **Legible hand writting**, proper figures and tidy work carry weightage.
- Answers to the questions should be **Brief and Specific.**

Q. N.		Points	CO	Module	BL	PI
1	A) **Discuss:** *'Is Management a science or an art?'* **Explain:** Functions of a Manager in an organisation.	(10)	1	1	II, V	9.1.1
	B) **State**: Different types of organisations. **Explain:-** Need of good organisation. **Explain:** Effects/symptoms of bad organisation with an exapmle of actual industry/organisation indicating these symptoms.	(10)	1	1	I,II	9.1.1
2.	A) **Discuss:** Various factors which may act as *'Sources of Stress'* for an employee in an organisation. and **Explain:** Various Stress Management Techniques and Methods to be adapted by an employee as well as an organisation.	(10)	1,2	2	II, V	9.1.1
	B) **Explain:** Scope and importance of Human Resource Management in various functional areas of an organisation. **Illustrate:** With suitable examples.	(10)	1	2	II, V	9.1.1

3	A) **Explain:** '*Break-Even Analysis is as an effective managerial tool in an organisation'* **describing** assumptions and limitations in break-even analysis.Alfa Industries Ltd. provides the following data of its operations. Selling price per article = Rs.10/-, Variable Cost Per article = Rs.6/-, Fixed Cost per article = Rs. 80/- . **Construct:** Break-even chart **using graph paper** and **Determine:** Break-even point. Starting with 0 units of sale, take the output units in increments of 5000 units. B) **Explain:** Difference between Cost Control and Cost Reduction. **Describe:** Techniques for Cost Control and Programmes for Cost Reeduction in an organisation.	(10) (10)	1,2 1,2	3 3	'II, III, V II	9.1.1 9.1.1
4	A) **Explain:**Role of Portfolio Manager in maiataining the Risk-Return Relationship for investing in stock market by a customer. The intitial price of a share is Rs.60/- and final price is Rs. 69/-. Dividend paid at the end of year-1 is Rs. 2=40. **Calculate:** i) Total Return ii) Current Return and iii) Capital Return. B) **Explain:** Objectives of cost accounting and different types of costs with suitable examples.	(10) (10)	1,2 1,2	4 4	II, V II	9.1.1 9.1.1
5	A) **Define:** Enterpreneurship.**Explain:** How '*An enterpreneur differs from a Manager?*' by describing entrepreneurial characteristics. B) **Explain:** Need for promotion of enterpreneurship and small business especially in country like India.	(10) (10)	1,3 1,3	5 5,6	I,II II	9.1.1 9.1.1
6	A) **Explain:** Functional areas of a small business enterprise in details. B) **Explain**: Tangible and intangible benefits of implememtation of ERP in industry.	(10) (10)	1,3 1,4	6 7	II II	9.1.1 9.1.1
7	**Expalin: ANY THREE** of the following in brief: A) Integration of ERP and CRM B) ERG Theory of motivation C) Organisational Groups and Group Dynamics D) Types of Risks and Returns E) Profit-Volume Analysis	(20)	1,2 3.4	2,3 4,7	II	9.1.1

2015/19 Lab

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Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058

END SEM- May 2019 Examinations

Program: B.Tech Mechanical Engineering | **Duration: 3 Hours**

Course code: PEC- BTM808 | **Maximum Marks: 100**

Name of the Course:Supply Chain Management | **Semester:VIII**

Instructions:

- **Question No. 1 is compulsory, Attempt any four questions out of remaining six.**
- **Answers to all sub questions should be grouped together.**
- **Assume suitable data if necessary justify the same and state the assumptions clearly.**
- **Draw suitable diagrams wherever necessary.**

Q. No.		Points	CO	BL	PI
Q1	**(a)** What Do You mean by Bull-whip effect in SCM? What are the causes of Bull-whip effect?	10	1	L1	1.2.1
	(b) Gillette (India) Ltd is the leader in male and female grooming products. Till the year 2000 nobody was clearly accountable for the accuracy of the forecast at Gillette, and poor forecasting resulted in several supply chain problems like low service levels and high imbalanced inventories. In 2002 brand managers were given responsibility of demand forecasting. As there were no standard processes so the firm realized that brand managers were, more connected with their sales targets and were not focusing on forecasting accurate market demands. If you are given the responsibility of demand forecasting how would you forecast the demand of the Gillette (India) Ltd?	10	1	L2	
Q2	**(a)** From the following data **calculate** a 3 period and 5 period moving average, also forecast the demand for 11th period:	10	2	L4	1.4.1
	(b) Explain Various Global Logistics Trends.	10	1	L2	
Q3	**(a) Elaborate** "Plan", "Source", "Make" and "Deliver" as SCOR Model structure.	10	2	L4	1.4.4
	(b) What is Logical Costing? **Distinguish** between activity based costing and mission based costing.	10	1	L6	

Year	1	2	3	4	5	6	7	8	9	10	11
Demand In Units	120	125	130	135	140	145	150	165	180	200	?

Q4	**(a)** What do you mean by Cross docking? **Elaborate** the cross docking practices followed by the Indian Trucking Industry. **(b)**What are the drivers of supply chain performance? With a neat diagram, **describe** the framework for structuring drivers.	**10** **10**	**1** **1**	**L2** **L6**	**1.3.1**
Q5	**(a)**Take an example of Milk distribution chain. **Describe** key functionalities that makes it consistent and error-free. **(b)**A manufacturer has to supply his customers 3600 units of his product per year. Shortages are not permitted. Inventory carrying cost amounts Rs. 1.2 per unit per annum. The set-up cost per run is Rs. 80. **Find :** (i) Economic order quantity. (ii) Optimum number of order per annum. (iii) Average annual inventory cost (minimum) (iv)Optimum period of supply per optimum order.	**10** **10**	**4** **2**	**L1** **L5**	**2.3.2**
Q6	**(a)** Why are RFID tags used in warehouse? **(b)** When is reverse supply chain used? **(c)** Explain the criteria's to evaluate a supplier in a supply chain. **(d)** Discuss the Impact of risk sharing on supplier performance.	**05** **05** **05** **05**	**4**	**L4**	**2.3.2**
Q7	Starbucks is pretty much a household name. However, like many of the most successful worldwide brands, the coffee shop giant has been through its periods of supply chain pain. In fact, during 2007 and 2008, Starbucks leadership began to have serious doubts about the company's ability to supply its 16,700 outlets. As in most commercial sectors at that time, sales were falling. At the same time though, supply chain costs rose by more than $75 million. **Questions:** **(a) State** the facts and **analyse** the case for cost reduction. **(b)** How does the cost reduction takes place? **Elaborate** the challenges and methodology.	**10** **10**	**3**	**L5**	**4.2.2**

Lab
2018/19 [1:30]

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Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058

END SEM EXAMINATION

Program: **B. Tech. in Mechanical Engineering**
Class: **Final Year B. Tech. (Mechanical)**
Course code: **BTM 811**
Course: **Power Plant Engineering**

Date: **May-2019**
Duration: **3 Hr.**
Max. Points: **100**
Semester: **VIII**

Instructions:

- Attempt **ANY 05** of the following questions.
- Draw **neat Process diagrams /T-s Diagrams/ Figures** etc.wherever necessary.
- Use **Graph paper** for Load curve & Load Duration curve.
- **Legible hand writting**, proper figures and tidy work carry weightage.
- Answers to the questions should be **Brief and Specific.**
- **Assume suitable data** whwerever found necessary and mention the same.

<table>
<tr><th>Q N.</th><th></th><th>Points</th><th>CO</th><th>Module</th><th>BL</th><th>PI</th></tr>
<tr><td>1</td><td>A) Draw: the Chronological daily Load Curve and Load Duration Curve from the following observation.
<table>
<tr><th>Time</th><th>Load, kW</th><th>Time</th><th>Load, kW</th></tr>
<tr><td>6 am to 8 am</td><td>3000</td><td>5 pm to 6 pm</td><td>7000</td></tr>
<tr><td>8 am to 12 Noon</td><td>10000</td><td>6 pm to 9 pm</td><td>6000</td></tr>
<tr><td>12 Noon to 1 pm</td><td>5000</td><td>9 pm to 11 pm</td><td>6000</td></tr>
<tr><td>1 pm to 5 pm</td><td>10000</td><td>11 pm to 6 am</td><td>2000</td></tr>
</table>
If the Reserve capacity in the station is 3000 kW, Evaluate: i) Load Factor ii) Plant Capacity Factor iii) Plant use Factor</td><td>(10)</td><td>1,4</td><td>1</td><td>V</td><td>1.4.1</td></tr>
<tr><td></td><td>B) Explain: Differnet types of enrgy rates.Energy rates for for Mumbai city electricity supply are lower for Tata Power than Reliance Energy. Analyze : Reasons for the difference applying your subject knowledge.</td><td>(10)</td><td>1,4</td><td>1</td><td>II</td><td>1.4.1</td></tr>
<tr><td>2</td><td>A) Explain:Various types of Hydroelectric Power Plants.</td><td>(10)</td><td>2</td><td>2</td><td>II</td><td>1.4.1</td></tr>
<tr><td></td><td>B) Expalin: Adavanteges and Disadvantages of Hydro-electric plants with respected to thermal power plants.</td><td>(10)</td><td>1,2</td><td>2</td><td>II</td><td>1.4.1</td></tr>
</table>

3	A) **Explain:** Concept of Fluidized Bed Combustion and **Describe:** Working of Circulating Fluidised Bed (CFB) Combustor with neat sketch.	(10)	2	3	II, III	1.4.1
	B) **Compare:** Advantages of Diesel Power Plant over Gas Turbine Power Plants. Following parameters are noted for a performance test of a single cylinder four stroke diesel engine:- Brake load applied to drum of *1.8 m* diameter is *196 N*. Fuel consumption *is 0.12 kg/min* with calorific value of *41870 kJ//kg*. Total amount of cooling water passing through the jacket is *540 kg* with its inlet and outlet temperatures as *20 °C* and *60 °C* respectively. Total amount of air consumed is *6.1 kg/min*. The exhaust gases having *Cp = 1.005 kJ/ kg.K* leaving the engine cylinder at *300 °C* are released to atmosphere at *20 °C*. i) **Evaluate:** Brake Power and Thermal Efficiency of the engine. ii) **Estimate:** Heat Balance of the engine.	(10)	2,4	5	V	1.4.1
4	A) **Explain**: Working, advanatagges and disadvantages of Boiler Water Reactor (BWR) with a neat sketch.	(10)	2	4	II	1.4.1
	B) **Explain:** Criterion for classification and **State:** Types of Nuclear Power Plants based on these criterion. The rating of a Nuclear Power Plant for a submarine is *5 MW*. Overall Thermal Efficiency is *30%*. The fuel is U^{235}. **Evaluate:** Amount of Natural Uranium needed to generate this power if the average energy release per fission for this fuel is *190 MeV*.	(10)	2,4	4	II, V	1.4.1
5	A) **Explain:** Working, adnvtages and disadvanatges of Modified Open Gas Turbine Cycle (OGTC) Plant with a neat sketch and T-s Diagram.	(10)	2	5	II	1.4.1
	B) Following particulars relate to a simple closed cycle gas turbine plant using air as the working medium. Compressor Inlet Temperature =*26°C*, Air Pressure at Compressor inlet = *1 bar*, Pressure Rato= *5*, Maximum Temperature = *870 °C*, , Compressor efficiency = *0.8*, Turbine Efficiency = *0.84*, Calorific value of Fuel = *41840 kJ / kg*, Heater Loss = *10%* of heating value, For working medium air, *Cp = 1.005 kJ / kg.K* and *γ = 1.4*. **Evaluate:** i) Thermal Efficiency of plant ii) Fuel-Air Ratio iii) Air Rate iv) Work Ratio and v) Specific Fuel Consumption.	(10)	2,4	5	II, V	1.4.1
6	A) **Explain:** Difference between Combined Cycle Power Generation and Cogeneration. Explain: Working of Simple Gas Turbine Cycle and Single Pressure with neat process diagram, T-s and T-Q diagrams.	(10)	2	6	II	1.4.1
	B) **Explain:**Difference between Combined Cycle Power Generartion and Combined Power Generation. **Discuss:** Combined Steam and	(10)	2	6	II, III	1.4.1

	Hydroelectric Power Plant operation, describing i) Factors for selection as Peak or Base Load Plant and ii) Advantages of combined operation.					
7	A) **Explain:** Various Methods of removal of H_2S and Oxides of Sulphur from exhaust/ flue gases of Thermal Power Plants produced after combustion of fuel.	(10)	3	7	II	1.4.1
	B) **Explain: Any two** Pollution control devices in pollution control of thermal power plants.	(10)	3	7	II	1.4.1

Lab
2015/19
[1:30]

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.
End Semester Exam
May 2019

Max. Marks:100 Duration: 3HR
Class: B. Tech (Mechanical) Semester: VIII
Program: MECHANICAL ENGINEERING
Name of the Course: AUTOMOBILE ENGINEERING
Course Code : BTM 809

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	CO	BL	PI
Q1	(A) Derive equation for vehicle vibration with a single degree of freedom in terms of a) Free vibration b) Forced vibration. The springs of a motor vehicle carry a total load of 12118.6 N and with equal springing front and rear; the combined spring rate is 78359 N/m. Calculate the frequency of vertical natural vibration with the dampers removed. If the dampers are adjusted to give a total damping force 4025.6 N/m/s, calculate the frequency of damped vibrations and the ratio of the second downward movement to the first downward movement.	12	2	4	2.1.2
	(B) Explain Integration of Transmission and Engine ECUs in vehicle with suitable block diagram.	8	3	3	3.2.1
Q2	(A) A motor vehicle total weight 12150 N has road wheels of 0.61m effective diameter. The effective moment of inertia of the four road wheels and the rear axle together is 62.0 N-m^2, while that of the engine and flywheel is 6.2 N-m^2. The transmission efficiency is 90% and tractive resistance at a speed of 24 km/hr is 222.5 N. The total available engine torque is 203.6 N-m. A. Evaluate the gear ratio, engine to back axle to provide maximum acceleration of 1 in 4 grades, when travelling at 24km/HR.	10	1,2	6	2.2.3

	B. What is the maximum acceleration. C. Determine the engine r.p.m and power under these conditions.				
	(B) What Makes the Speedometer in a Car Fluctuate Sharply?explain speedometer with suitable sketch.	05	2	03	3.1.6
	(C) With neat sketch explains Flexible Rack System for wiper	05	3	03	3.1.6
Q3	**(A)** Discuss aerodynamic forces and moments on a vehicle. Explain Drag force, lift force and side force with empirical equation. Calculate vehicle's drag force, with a frontal area of 1.5 m^2, C_D of 0.4, and Traveling at 30 m/s.	10	1	4	3.4.1
	(B) How does a vibration damper work in automobile?	05	3	1	2.1.1
	(C) Explain Air-bag and seat belt pre-tensioner systems in vehicle.	05	4	2	2.1.1
Q4	**(A)** Explain the following with suitable sketch a) Electronically controlled hydraulic PAS. b) Electric PAS	10	3,4	3	2.2.2
	(B) A vehicle spring of semi elliptical type has 8 leaves of 75mm width and 10mm thickness. If the stress is not to exceed 220725kPa when the spring is loaded with 4905 N, estimate the effective length and deflection under this condition. If the spring is just flat under load, what is the initial radius? Take $E=196.2*10^6$. What Does a Sway Bar Do?	10	3,2	4	2.4.1
Q5.	**(A)** Distinguish between preventive maintenance and breakdown maintenance. Explain preventive maintenance: PM A, PM B, PM C & PM D.	10	3,2	1	2.4.2
	(B) State type of independent suspension system. Describe the construction and working of the MacPherson Strut suspension system. Also describe the objective of the suspension system.	10	3	3	3.2.2
Q6	**(A)** A track has pivoted pins 1.37m apart, the length of each track arm is 0.18 m and the track rod is behind the front axle and 1.27 m long. Determine the wheel base which will give true rolling for all wheels when the car is turning so that angle of inside lock is 40^0 calculate the correct angle of outside lock and turning circle radius of the inner front and	10	2	4	2.4.1

	outer rear wheels.				
	(B) Differentiate between cross-ply tyre and radial ply tyre with suitable figure. I have purchase tyre of this specification "LT 205/75 B 15" Explain the code of tyre.	10	3,4	3	2.2.3
Q7	**(A)** Name the system which injects 100% vaporized fuel into the combustion chamber. Explain the system in details with suitable diagram	10	2	3	3.4.1
	(B) Explain with the sketch the importance of the driver's seat. What are the basic parameters involved in the design of the driver seat.	10	1,4	6	2.2.2

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination - May 2019 Examinations

Lab 2015/19 (1:30)

Program: Mechanical Engineering

Course Code: PEC-BTM807

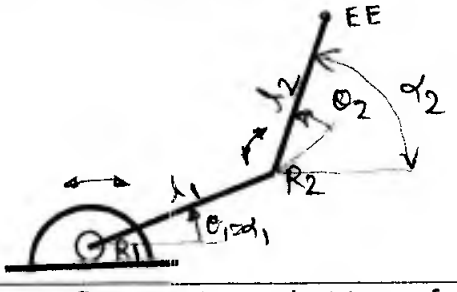
Course Name: **Industrial Robotics**

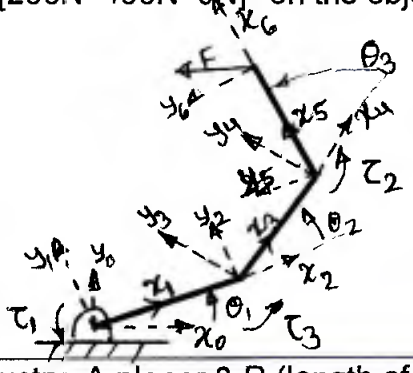
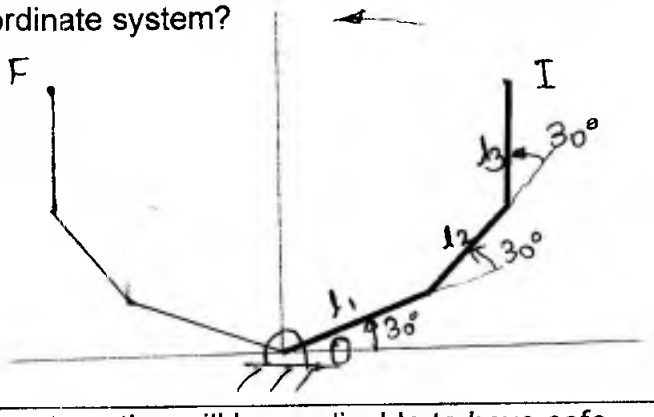
Duration: 03 hour

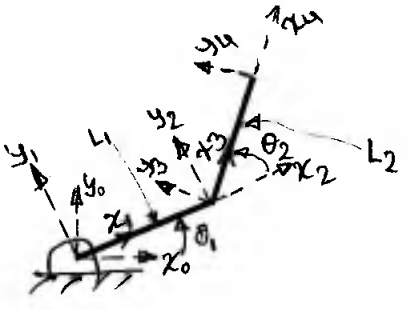
Maximum Points: 100 marks

Semester: **VIII**

Notes: 1.Questions number 01 is compulsory.
2. Solve any four main questions out of remaining six main questions.
3. Draw neat schematic diagrams wherever is necessary, highlight important points.
4. Assume suitable data if necessary and mention it.

Q.No.	Questions	Marks	CO	BL	PI
Q1 A	For the given planar 2R manipulator, evaluate the following; 1) Position of end effector in terms of Cartesian coordinates 2) Joint space parameters as a function of mechanism parameters 3) How many solutions exist for given position of the end effector 4) To have infinite number of solutions, suggest list of mechanism parameter or joint parameters conditions required. 5) Suggest that particular condition of end effector for which no solution and one solution exist. Fig. No. 1. 	10	2	3	2.1.3
Q1 B	A pharmaceutical firm wants a robot to perform high frequency pick and place type of actions for capsule drugs. Give suggestion about which type of robot will be suitable for this application without scarifying its production rate. Explain it with the help of following points: i) Structure, capability & its limitation ii) Neat schematic sketch showing its workspace volume?	10	3	1	1.2.4
Q2 A	To improve the following characteristics in stepper motor; a) Higher torque generation capability b) Precise position and speed control, Suggest which type of wave scheme can be applied to stepper motor to fulfill the requirement's? Prepare table of switching sequence for clockwise rotation of motor shaft? Draw necessary sketch?	10	2	1	2.1.4

	Give specific applications of different types of prehensive type and non-prehensive type of grippers?				
Q2 B	For given 3 link (3-R) manipulator shown in the figure 2. Find following; Calculate joint torque experienced by the each servomotor if tip of end effector exerts force $[200N \ 400N \ 0N]^T$ on the object? Draw Force vector?  Fig. No. 2.	10	2	3	1.2.4
Q3 A	In an Automobile industry, A planar 3-R (length of each link is equal to 2m) manipulators is installed to move an automobile engine from point 'I' (2.732, 4.732) to point 'F' (-2.732, 4.732) in 2 seconds only. Initial, final position of links and fixed mechanism parameter data provided in fig. no. 3. Also state number of boundary conditions if mechanism is kinematically consistent and motions are coordinated? Find the following; 1) Generalized equation for joint space angle's to define motion 2) Calculate Cartesian space co-ordinates of end effector point 'B' at regular time interval of 0.33 second and prepare the total table? 3) Plot graph of joint space angle Vs time and trajectory of point 'B' in Cartesian space co-ordinate system?  Fig. No. 3.	15	4	L2	2.1.2
Q3 B	Which type of robotic automation will be applicable to have safe positioning of robotic in welding workstation? With the help of necessary sketch explain required type of robotic automation?	5	2	L1	1.3.1

Q4 A	Derive expression for output power of DC motor by taking into account effect of torque constant and motor constant? Write down about important significant points and dependent entities of torque constant and motor constant? Also draw following neat sketches; a) Electric circuit sketch of an armature, b) show motor constant on graph plotted.	10	1	L3	3.1.4
Q4 B	For the given 2 link (2-R) manipulator shown in the figure 4. Find the following; a) Calculate velocity of end effector point as a function of angular velocity of joint b) Evaluate resolved velocity component of end effector point on 'frame 4'? c) Evaluate jacobian of transformation for velocity component & calculate velocity components (for give instant as shown in figure) of point 'EE' if angular velocity at joint R_1 is 10°/min and angular velocity at joint R_2 is 15°/min?  $L_1 = 1m$ $L_2 = 1m$ $\theta_1 = 30°$ $\theta_2 = 40°$ Fig. No. 4.	10	2	L4	1.2.5
Q5	Consider the PUMA 600 series robotic arm (in Fig. No. 5). Establish joint coordinate systems for the given robot configuration. a) A table of joint parameters. b) Complete direct kinematic solution for given robot. c) Set of link co-ordinate system	20	3	L2	2.4.5
Q6 A	Consider a six jointed robotic manipulator equipped with a digital TV camera capable of continuously monitoring position and movement of an object (in Fig. No. 6). Position and orientation (represented as T_i) of cup w.r.t. camera is expressed as matrix 'T_1', origin of robot base coordinate system w.r.t. camera is expressed as matrix 'T_2' & that of gripper w.r.t. base coordinate system 'T_3'. Determine position and orientation of cup w.r.t. gripper?	10	2	L4	2.2.1
Q6 B	Find the inverse kinematic solution for the spherical robotic manipulator transform SPH(Φ,ψ,r). Rotation about 'Z' axis and 'X' axis represented	10	3	L5	1.2.5

	by angle Φ and ψ respectively.				
Q7 A	A manufacturer wants to assemble one thousand components (Part A with Part B) (in Fig. No. 7) in a shift using robotic arm manipulator. One its mating objects have spherical projections over the mate surface. Estimate the position and orientation of end effector and of an object just before gripping action (for lift) and just before final assembly position (for release).	10	4	L2	1.2.5
Q7 B	What is tactile sensor? Explain Pneumatic switch based and photodetector based tactile sensor with necessary schematic sketch? Give their specific applications?	10	3	L3	2.1.4

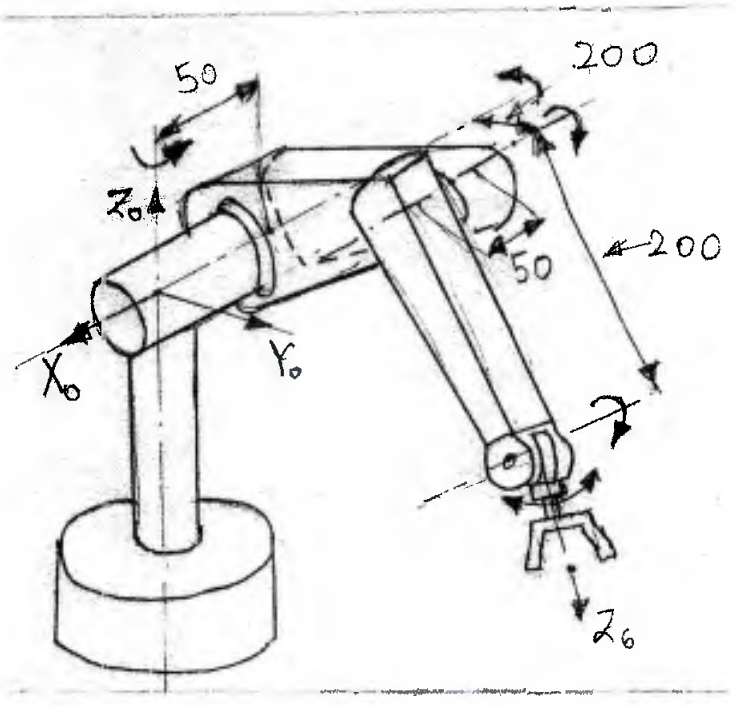


Fig. No. 5

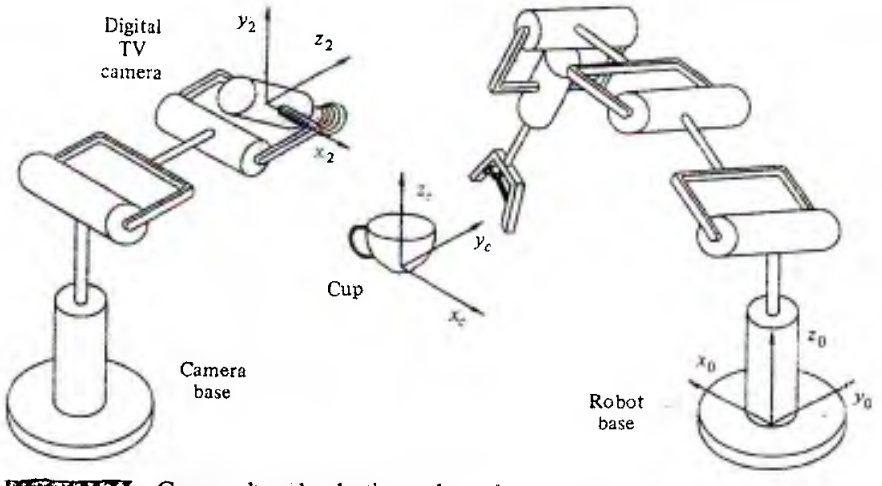


FIGURE 2.2.1 Camera-based robotic work station.

Fig. No. 6

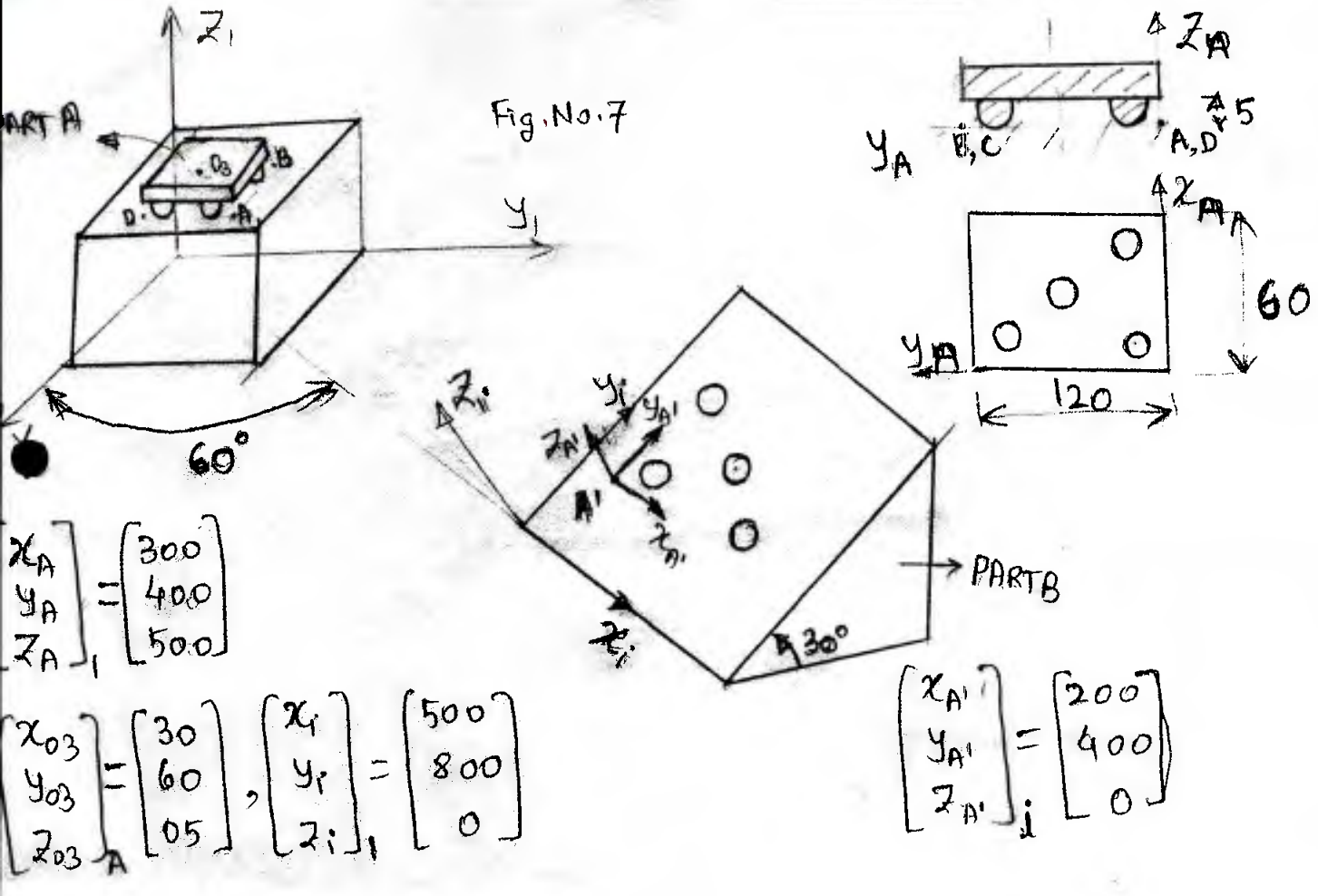


Fig. No. 7

$$\begin{bmatrix} x_A \\ y_A \\ z_A \end{bmatrix}_1 = \begin{bmatrix} 300 \\ 400 \\ 500 \end{bmatrix}$$

$$\begin{bmatrix} x_{03} \\ y_{03} \\ z_{03} \end{bmatrix}_A = \begin{bmatrix} 30 \\ 60 \\ 05 \end{bmatrix}, \quad \begin{bmatrix} x_i \\ y_i \\ z_i \end{bmatrix}_1 = \begin{bmatrix} 500 \\ 800 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} x_{A'} \\ y_{A'} \\ z_{A'} \end{bmatrix}_i = \begin{bmatrix} 200 \\ 400 \\ 0 \end{bmatrix}$$

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

July 2019 Re-exam Examinations

Program: B.Tech.(Mechanical)
Course Code: PCC-BTM802,BTM802
Course Name: CAD/CAM/CIM

Duration: 3hrs
Maximum Points: 100
Semester: VIII

1. Solve any five questions out of seven
2. Figures to the right indicates full marks
3. Assume suitable data wherever necessary

Q.No.	Questions	Points	CO	BL	PI
Q.1 (A)	Explain the properties of Bezier & B-Spline Curves with neat sketches?	10	1	3	5.2.1
(B)	• Explain Cutter radius compensation in CNC machines with neat sketch? Also write & explain its G-code format • Explain Tool length compensation with its figure? Also write & explain its G-code format?	10	1	3	5.2.1
Q.2 (A)	• Write a C++ program for DDA Line algorithm • Write a C++ program for Bresenhams Circle Algorithm	15	2,3	4	5.2.1
(B)	Explain the Flexible Manufacturing system (FMS) with a neat diagram.	05	1,3	4	1.1.1
Q.3 (A)	• Write a short note on Socio-techn0-economic aspects of Computer Integrated Manufacturing (CIM) • Database requirements of CIM	10	2,1	3	1.1.1
(B)	A Triangle is defined by 3 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) & (1,1,1).	10	2,3	4	5.2.1
Q.4 (A)	• Explain Cohen Sutherland Algorithm with net figures • Explain Artificial Intelligence in Design with neat figure	10	1	3	5.2.1
(B)	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	2	3	5.2.1
Q.5 (A)	Explain the following • CAD-VR Integration • CAD-PLM integration	10	3	4	1.1.1
(B)	Explain various types of statements used in APT part programming along with neat figures?	10	3	4	1.1.1
Q.6 (A)	• What are the enabling technologies required for Augmented Reality? explain them with neat sketches	10	1,2,3	4	1.1.1

(B)	A rectangle ABCD has vertices A(10,20), B(40,20), C(40,40) & D(10,40). This rectangle is to be sheared in such a way that coordinates of vertices C & D change to C'(50,40) and D'(20,40), with A & B remaining unchanged. Write the necessary transformations & find the final coordinates of rectangle	10	2	4	5.2.1
Q.7	Write Short notes on (Any Three) • Design for Assembly (DFA) • Reverse Engineering (RE) • Structured Query Language (SQL) • Engineering Database Mgt. Systems (EDMS) • Concurrent Engineering (CE) • Group Technology (GT)	20	1	3	5.2.1