MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. V Semester End Examinations
(Common to CE, EEE, ME, ECE, MCT, MME & CSM)

(Model Question Paper)

Subject Title: Business Economics and Financial Analysis　　　**Subject Code: MS501HS**

Time: 3 hours　　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 60

Note: Answer ALL Questions
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
1. a)	Define Business Economics	1	1	1	1
1. b)	What is meant by National Income?	1	1	1	7
	Unit-II				
1. c)	Describe Cross Elasticity of Demand	1	2	2	12
1. d)	What are the Determinants of supply?	1	1	2	7
	Unit-III				
1. e)	Explain Monopolistic Competition	1	2	3	7
1. f)	What is meant by Marginal Cost?	1	1	3	11
	Unit-IV				
1. g)	Describe Accounting Equation	1	2	4	11
1. h)	What is meant by Materiality Convention?	1	1	4	8
	Unit-V				
1. i)	Explain Liquidity	1	2	5	11
1. j)	List Profitability ratios	1	1	5	11

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
2. a)	Explain different sources of capital.	5	2	1	1
2. b)	Describe the advantages and disadvantages of sole proreitorship.	5	2	1	7
	OR				
2. c)	Explain the nature and scope of Business Economics.	5	2	1	7
2. d)	Differentiate between Private Limited Companies and Public Limited Companies	5	4	1	7
	Unit-II				
3. a)	Describe Law of Demand and its exceptions	5	2	2	11
3. b)	Explain the Determinants of Supply and supply function.	5	2	2	7
	OR2				
3. c)	The quantity demanded for the product X is 30 units, when the price is Rs.15. The quantity demanded increased to 40 units, as price decreased to Rs. 10. Compute Price Elasticity of demand.	5	3	2	2
3. d)	Explain different methods of Demand Forecasting	5	2	2	12
	Unit-III				
4. a)	How can a producer determine the least-cost combination of inputs?	5	1	3	3
4. b)	Differentiate between perfect competition and monopoly competition.	5	4	3	8
	OR				
4. c)	Explain Law of Variable Proportions with the help of graph.	5	2	3	7
4. d)	Describe various Pricing strategies used by modern business organizations.	5	2	3	5
	Unit-IV				
5. a)	Classify the following accounts into various (Personal, Real or Nominal) types of accounts. i) Salary account ii) Outstanding wages account iii) Rent account	5	2	4	11

	iv) Bank account v) Insurance prepaid vi) Drawings account vii) Bad debts account viii) Machinery account ix) Furniture account x) Patents account				
5. b)	Journalise the following transactions: Jan 1, 2021 Commenced with Cash Rs. 8,00,000 Jan 3, 2021 Purchased Goods worth Rs. 1,50,000 Jan 8, 2021 Sold Goods to Mr. Ramu Rs. 1,10,000 Jan 30, 2021 Salaries paid Rs. 40,000 Jan 30, 2021 Rent paid Rs. 20,000	5	3	4	11
	OR				
5. c)	Explain Double Entry System and its advantages	5	2	4	11
5. d)	Prepare Trading and Profit and Loss account from the following information.	5	3	4	11

Trial Balance as on 31.03.2021

Particulars	Debit(₹)	Credit(₹)
Capital		1,00,000
Purchases	40,000	
Furniture	30,000	
Interest received		3,000
Cash	15,000	
Debtors	27,000	
Office Stationery	3,000	
Machinery	70,000	
Bank Loan		5,000
Bills Payable		2,000
Opening Stock	10,000	
Sales		90,000
Wages paid	600	
Salaries paid	2,500	
Electricity charges	1,200	
Insurance paid	700	
Total	2,00,000	2,00,000

Adjustments:
i)   Closing Stock ₹ 12,000
ii)   Depreciate Machinery @10% p.a.
iii)   Salaries outstanding ₹ 500

	Unit-V				
6. a)	How accounting ratios are useful in the inter-firm comparison.	5	1	5	10
6. b)	From the given Balance Sheet calculate: a) Debt-equity ratio b) Liquidity ratio c) Fixed assets to current assets ratio and d) Fixed assets to Net worth ratio.	5	3	5	10

Balance Sheet

Liabilities	Rs.	Assets	Rs.
Share Capital	1,00,000	Goodwill	60,000

		Liabilities	Amount	Assets	Amount				
		Retained Earnings	10,000	Machinery	1,00,000				
		Profit and loss a/c	40,000	Stock	30,000				
		Secured loans	80,000	Debtors	70,000				
		Creditors	40,000	Furniture	10,000				
		Provision for taxation	30,000	Cash	30,000				
			3,00,000		3,00,000				

OR									
6. c)	Differentiate Liquidity ratios and leverage ratios.					5	4	5	11
6. d)	The Balance Sheet of ABC Limited as on 31-03-2018 was as follows:					5	3	5	11

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	1,40,000	Plant and Machinery	1,24,000
Reserves and Surplus	1,28,000	Land and Buildings	1,30,000
Debentures	1,32,000	Furniture & Fixtures	26,000
Creditors	26,000	Stock	2,000
Bank overdraft	4,000	Debtors	22,000
Provision for Taxation:	6,000	Investments (Short-term)	4,000
Outstanding Expenses	2,000	Cash	12,000
Bills payable	2,000	Cash at Bank	65,000
			55,000
	440,000		440,000

From the above, compute and interpret
a) Current Ratio b) Quick Ratio c) Absolute Liquid Ratio d) Debt-Equity Ratio e) Proprietary Ratio.

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. V Semester End Examinations
(Common to ME & MCT)
(Model Question Paper)

MR-22

Subject Title: Dynamics of Machinery   **Subject Code: ME501PC**
Time: 3 hours   Max. Marks : 60

Note: Answer ALL Questions
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
1. a)	What is the principal of gyroscope	1	1	1	1
1. b)	Define the term inertia force and inertia torque	1	1	1	2
	Unit-II				
1. c)	What is meant by expression friction circle?	1	1	2	1
1. d)	What is meant by expression friction circle?	1	2	2	1
	Unit-III				
1. e)	What is meant by turning moment diagram or crank effort diagram?	1	1	3	2
1. f)	Explain the terms 'fluctuation of energy' and 'fluctuation of speed' as applied to flywheels.	1	1	3	2
	Unit-IV				
1. g)	What is meant by balancing of rotating masses?	1	1	4	2
1. h)	Write a short note on primary balancing	1	1	4	2
	Unit-V				
1. i)	What are the causes and effects of vibrations?	1	1	5	12
1. j)	What do you meant by logarithmic decrement?	1	1	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
2. a)	Derive an expression for gyroscopic couple in standard form.	5	4	1	1
2. b)	The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45 m and a speed of 3000 rpm clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship. when the ship is steering to the left on a curve of 100 m radius at a speed of 36 km/h	5	3	1	1
	OR				
2. c)	A slider-crank mechanism with the following dimensions is acted upon by a force F= 2kN at B as shown in Figure. Take OA = 100 mm and A B = 450 mm. Determine the input torque 'T' on the link OA for the static equilibrium of the mechanism for the given configuration.	10	2	1	1
	Unit-II				
3. a)	Which of the two assumptions-uniform intensity of pressure or uniform rate of wear, would you make use of in designing friction clutch and why?	5	1	2	6
3. b)	A bicycle and rider of mass 100 kg are travelling at the rate of 16 km/h on a level road. A brake is applied to the rear wheel which is 0.9 m in diameter and this is the only resistance acting. How far will the bicycle travel and how many turns will it make before it comes to	5	3	2	12

	rest? The pressure applied on the brake is 100 N and μ = 0.05.				

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3. c)	A conical pivot with angle of cone as 1200, supports a vertical shaft of diameter 300 mm. it is subjected to a load of 20 kN. The coefficient of friction is 0.05 and the speed of shaft is 210 rpm. Calculate the power lost in friction assuming (i) uniform pressure (ii) uniform wear	5	2	2	1
3. d)	A band and block brake has 14 blocks. Each block subtends an angle of 14^0 at the center of the rotating drum. The diameter of the drum is 750 mm and the thickness of the blocks is 65mm. The two ends of the band are fixed to the pins on the lever at distance of 50 mm and 210 mm from the fulcrum on the opposite sides. Determine the least force required to be applied at the lever at a distance of 600 mm from the fulcrum if the power absorbed by the blocks is 180 kW at 175 rpm. Coefficient of friction between the block and the drum is 0.35.	5	1	2	2

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4. a)	The turning moment requirement of a machine is represented by the equation T = (1000+500 sin 2θ-300cos 2θ) N-m. Where θ is the angle turned by the crankshaft of the machine? If the supply torque is constant, determine: i) The moment of inertia by the flywheel. The total fluctuation of speed is not to exceed one percent of the mean speed of 300 rpm. ii) Angular acceleration of the flywheel when the crankshaft has turned through 450 from the beginning of the cycle. iii) The power required to drive the machine.	10	1	3	1

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4. c)	State the different types of governors. Explain about any one of them	4	3	3	12
4. d)	The following particulars refer to a Wilson-Hartnell governor: Mass of each ball = 2 kg; minimum radius = 125 mm ; maximum radius = 175 mm ; minimum speed = 240 rpm ; maximum speed = 250 rpm ; length of the ball arm of each bell crank lever = 150 mm; length of the sleeve arm of each bell crank lever = 100 mm ; combined stiffness of the two ball springs = 0.2 kN/m. Find the equivalent stiffness of the auxiliary spring referred to the sleeve.	6	4	3	12

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5. a)	The following data refer to two cylinder locomotive with cranks at 90°: Reciprocating mass per cylinder = 300 kg ; Crank radius = 0.3 m ; Driving wheel diameter = 1.8 m ; Distance between cylinder centre lines = 0.65 m ; Distance between the driving wheel central planes = 1.55 m. Determine i) the fraction of the reciprocating masses to be balanced, if the hammer blow is not to exceed 46 kN at 96.5 kmph, ii) the variation in tractive effort and iii) the maximum swaying couple.	10	1	4	2

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5. c)	Four masses M1, M2, M3 and M4 are 200kg, 300kg, 240kg and 260kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively and the angle between successive masses are 45°, 75° and 135°. Find the position and magnitude of balance mass required if its radius of rotation is 0.25m.	10	1	4	2

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6. a)	Derive an equation for the natural frequency of free transverse vibration of a shaft headed with a number of concentrated loads, by energy method.	5	4	5	2
6. b)	Discuss briefly with neat sketches the longitudinal, transverse and torsional free vibrations	5	1	5	1

		OR				
6. c)	Derive an equation for the natural frequency of free vibration by energy method	5	3	5	1
6. d)	A shaft, 1.5 m long, supported by flexible bearings at the ends carries two wheels each of 50 kg mass. One wheel is situated at the centre of the shaft and the other at a distance of 375 mm from the centre towards left. The shaft is hollow of external diameter 75 mm and internal diameter 40 mm. The density of the shaft material is 7700 kg/m^3 and its modulus of elasticity is 200 GN/m^2. Find the lowest whirling speed of the shaft, taking into account the mass of the shaft.	5	1	5	1

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. V Semester End Examinations
(Mechanical Engineering (Mechatronics))
(Model Question Paper)

Subject Title: Mechanical Measurements and Control Systems   **Subject code: MT501PC**

Time: 3 hours   Max. Marks : 60

Note: Answer ALL Questions
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
1. a)	Differentiate between Active and passive transducers with examples	1	2	1	3
1. b)	Enumerate the advantages of Electrical transducers over Mechanical transducers	1	2	1	3
	Unit-II				
1. c)	Give the classification of Pressure measuring instruments.	1	3	2	1
1. d)	List out the advantages of Electro-Magnetic flow meter.	1	3	2	1
	Unit-III				
1. e)	Compare the sensitivity of full bridge and half bridge circuit.	1	2	3	3
1. f)	Enumerate the limitations of contact type tachometers.	1	2	3	3
	Unit-IV				
1. g)	Define the terms wet bulb and dry bulb temperatures.	1	2	4	1
1. h)	Enumerate the limitations of elastic force members.	1	3	4	1
	Unit-V				
1. i)	Define Transfer function.	1	2	5	4
1. j)	Discuss the merits and demerits of open and closed loop control systems.	1	3	5	4

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
2. a)	Explain the construction and working of LVDT with a neat diagram	5	2	1	3
2. b)	What are the errors in instruments and how are they classified? Explain the static characteristics of instruments	5	2	1	3
	OR				
2. c)	Explain the measurement of displacement using capacitive transducers.	5	2	1	3
2. d)	Explain the principle of working of RTD, Thermistor and its uses.	5	2	1	2
	Unit-II				
3. a)	Explain the working principle and operation of turbine flowmeter with neat sketch.	5	3	2	4
3. b)	Explain the construction and working of a Mcleod Gauge	5	2	2	3
	OR				
3. c)	Give the constructional details and state the advantages of fuel level indicator by using capacitive method.	5	2	2	3
3. d)	What are the different types of materials used for Bourdon Tubes for various pressures?	5	2	2	2
	Unit-III				
4. a)	What is gauge factor? Explain the principle and working of strain gauges with quarter bridge arrangement.	5	2	3	3
4. b)	What are Strain Gauge Rosettes? Explain anyone Strain gauge Rosette	5	3	3	3
	OR				
4. c)	Describe the theory of general-purpose accelerometers and explain the working of seismic transducer.	5	4	3	3

		M	L	CO	PO
4. d)	Explain the working principle and construction of stroboscope	5	2	3	2
Unit-IV					
5. a)	Explain the working and construction of a hydraulic load cell.	5	3	4	5
5. b)	Explain the working of mechanical humidity sensing absorption hygrometer.	5	4	4	5
OR					
5. c)	Explain the working of Electrical Hygrometer for measuring the relative humidity.	5	2	4	4
5. d)	What is a load cell? Explain the measurement of torque using magneto-strictive method.	5	3	4	3
Unit-V					
6. a)	Draw and explain block diagram for measurement and control of speed of a motor.	5	5	5	4
6. b)	Describe the elements of a control system.	5	3	5	4
OR					
6. c)	Explain the term servomechanism and state its applications	5	2	5	4
6. d)	Explain the measurement of temperature of a process using closed loop control system with a neat diagram.	5	5	5	4

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

Subject Title: Manufacturing Process & Machine Tools   **Subject Code: MT502PC**
Time: 3 hours   Max. Marks : 60

Note: Answer ALL Questions
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
1. a)	Define allowance? List out different allowances used in casting	1	1	1	5
1. b)	List the various applications of casting process	1	1	1	6
	Unit-II				
1. c)	Name different types of rolling mills.	1	1	2	4
1. d)	Differentiate stretch forming and bending?	1	1	2	1
	Unit-III				
1. e)	Write briefly about Forward Extrusion and Backward Extrusion.	1	1	3	4
1. f)	What are the various forging operations	1	1	3	1
	Unit-IV				
1. g)	How is the size of a lathe specified	1	1	4	4
1. h)	Compare shaping and slotting.	1	1	4	1
	Unit-V				
1. i)	Define Compound Indexing	1	1	5	1
1. j)	Differentiate lapping and honing processes	1	1	5	1

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
2. a)	Explain the different types of patterns commonly used with neat sketches	5	2	1	1
2. b)	Write the advantages, limitations and product applications of investment casting method	5	2	1	4
	OR				
2. c)	Analyze the inert gas welding with neat sketch	5	4	2	5
2. d)	What are the defects that are generally found in welding? Describe their cause and remedies	5	2	2	4
	Unit-II				
3. a)	Explain the process of thermit welding and discuss its advantages	5	2	2	1
3. b)	What is strain hardening? Explain its mechanism	5	2	2	5
	OR				
3. c)	Compare the properties of Cold and Hot worked parts	5	4	2	1
3. d)	Distinguish wire drawing and tube drawing with sketches	5	4	2	5
	Unit-III				
4. a)	Distinguish hot and cold extrusion. Give two examples of components produced by extrusion	5	4	3	3
4. b)	Name different forging operations. Explain about fullering and edging operations	5	3	3	1
	OR				
4. c)	Define the process of extrusion and explain Hydrostatic Extrusion with a neat sketch	5	3	3	1
4. d)	With the help of neat sketch, explain the principle of rotary forging.	5	3	3	3
	Unit-IV				
5. a)	Explain briefly the various lathe operations	5	4	4	3
5. b)	Sketch and describe any one quick return mechanism of shaper.	5	4	4	4
	OR				

		M	L	CO	PO
5. c)	Draw a neat sketch of taper turning by taper turning attachment method	5	4	4	3
5. d)	Explain the Radial drilling machine and its components with neat sketch	5	2	4	4
Unit-V					
6. a)	Describe the features and working of a universal milling machine with the help of a block diagram	5	4	5	3
6. b)	Explain Compound Indexing in detail.	5	5	5	4
OR					
6. c)	Classify the milling cutters according to the method of mounting the cutter	5	3	5	4
6. d)	Explain the principle of cylindrical grinding	5	3	5	4

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome

MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)
B.Tech. V Semester End Examinations
(Mechanical Engineering (Mechatronics))
(Model Question Paper)

| **MR-22** |

Subject Title: Principles of Machine Design　　　　　　**Subject Code: MT503PC**
Time: 3 hours　　　　　　　　　　　　　　　　　　　　Max. Marks　: 60

Note: Answer ALL Questions
Part-A (10 x 1 = 10 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
1. a)	Write Short note on Preferred Numbers.	1	2	1	1
1. b)	Define the terms Poisson's ratio, volumetric strain and Bulk modulus.	1	1	1	2
	Unit-II				
1. c)	Distinguish between alternating stresses and fluctuating stresses.	1	2	2	1
1. d)	Write Soderberg's equation and state its applications.	1	1	2	1
	Unit-III				
1. e)	State the factors on which power transmitted by a belt depends on	1	3	3	1
1. f)	What are the types of stresses induced in the Shafts	1	1	3	1
	Unit-IV				
1. g)	What is meant by interference in Involute Gears	1	2	4	2
1. h)	Define the terms module and diametrical pitch of a spur gear	1	2	4	2
	Unit-V				
1. i)	What is meant by bearing Characteristic number	1	1	5	1
1. j)	What are the essential properties of Sliding contact Bearing materials	1	2	5	2

Part-B (5 x 10=50 Marks)

Q. No.	Stem of the Question	M	L	CO	PO
	Unit-I				
2. a)	Enumerate the various factors to be considered for the selection of materials for the design of machine elements.	5	2	1	2
2. b)	The stresses induced at a critical point in a machine component made of steel 45C8 are as follows: σx = 120 MPa, σy = 60 MPa and τxy = 80 MPa. Calculate the factor of safety by (i) the maximum normal stress theory, (ii) the maximum shear stress theory	5	3	1	2,4
	OR				
2. c)	Enumerate the various phases of design in a product development.	5	3	1	2
2. d)	The load on a bolt consists of an axial pull of 10kN together with a transverse shear force of 5kN. Find the diameter of bolt required according to Maximum Distortion theory and Maximum principal Strain theory.	5	3	1	2,4
	Unit-II				
3. a)	A steel rod is subjected to a reversed axial load of 180KN. Find the diameter of the rod for factor of safety =2. Given ultimate strength is 1070Mpa, yield Strength is 910Mpa and endurance strength is half of ultimate strength. Other correction factors are taken as follows: For axial loading = 0.7, for machine surface finish= 0.8, for size= 0.85, stress concentration = 1.0	5	2	2	1
3. b)	Describe the terms Stress concentration and Notch Sensitivity with relevant examples.	5	3	2	2,3
	OR				
3. c)	Define endurance limit. What are the factors that affect endurance limit of a machine part?	5	3	2	1
3. d)	A uniform bar having a machined surface is subjected to an axial load varying from 400 kN to 200 kN. The material of the bar has ultimate	5	2	2	2,3

P.T.O.

		M	L	CO	PO
	strength of 600 MPa and endurance strength of 300 MPa and factor of Safety is 2. Find the diameter of the bar using (i) Soderberg line, (ii) Goodman line.				
Unit-III					
4. a)	What are the essential properties of the materials used for the design of shafts?	5	2	3	2,3
4. b)	A shaft made of mild steel is required to transmit 100kW at 300 rpm. The supported length of the shaft is 3m. It carries two pulleys each weighing 1500N supported at a distance of 1m from the ends respectively. Assuming the safe value of stress, determine the diameter of the shaft.	5	2	3	2,3
OR					
4. c)	Explain, with the help of neat sketches, different types of flat belt drives.	5	2	3	1
4. d)	A flat belt is required to transmit 30 kW from a pulley of 1.5 m effective diameter running at 300 rpm. The angle of contact is spread over 11/24 of the circumference. The coefficient of friction between the belt and pulley surface is 0.3. Determine, taking centrifugal tension into account, width of the belt required. It is given that the belt thickness is 9.5 mm, density of its material is 1100 kg / m3 and the related permissible working stress is 2.5 MPa	5	3	3	2,4
Unit-IV					
5. a)	Write the expressions for static strength, limiting wear load and dynamic load for helical gears and explain the various terms	5	3	4	4
5. b)	A pair of parallel helical gears consists of a 20 teeth pinion and the velocity ratio is 3:1. The helix angle is 150 and the normal module is 5 mm. Calculate a) The pitch circle diameters of the pinion and the gear; and b) The centre distance	5	3	4	4
OR					
5. c)	State the advantages of Helical gear over Spur Gear.	5	3	4	4
5. d)	A bronze spur pinion rotating at 600 rpm drives a cast iron spur gear at a transmission ratio of 4:1. The allowable static stresses for the bronze pinion and cast iron gear are 84 MPa and 105 MPa respectively. The pinion has 16 standard 200 full depth involute teeth of module 8 mm. The face width of both the gears is 90 mm. Find the power that can be transmitted from standpoint of strength	5	3	4	4
Unit-V					
6. a)	Design a journal bearing for a steam turbine whose shaft is supported on two bearings one at each side of the turbine and is coupled with a generator for power production. The weight of the turbine with shaft is measured as 40KN, n=1500rpm. Diameter of the shaft is 100 mm, C=1000W/m2/C	5	2	5	2,3
6. b)	Write a short note on classification of Anti friction Bearings	5	2	5	1
OR					
6. c)	Distinguish between Hydrodynamic bearings and Hydrostatic bearings.	5	2	5	1
6. d)	For a single row deep groove ball bearing for a radial load of 4000N and an axial load of 5000N, operating at a speed of 1600rpm for an average life of 5 years at 10 hours per day, Find the Dynamic Load rating. Assume uniform and steady load.	5	4	5	4

M: Marks; L: Bloom's Taxonomy Level; CO: Course Outcome; PO: Programme Outcome