Department of Mechanical Engineering

II Year IV Semester

4ME2-01: Data Analysis

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-I

Q 1 What is the difference between univariate, bivariate and multivariate?	**BLT-2**	**CO-1**
Q 2 What is the process of data anlaysis?	**BLT-2**	**CO-1**
Q 3 What is the purpose of statistical analysis?	**BLT-2**	**CO-1**
Q 4 Define multivariate analysis and discuss its techniques.	**BLT-1**	**CO-1**

ASSIGNMENT-II

Q 1 Write short notes on multiple regression.	**BLT-1**	**CO-2**
Q 2. Explain the meaning of analysis of variance. State the basic principle of ANOVA.	**BLT-2**	**CO-2**
Q 3. What is stepwise regression we used? Also mention the variable selection procedure in stepwise regression?	**BLT-2**	**CO-2**
Q 4 Define the hierarchical regression.	**BLT-1**	**CO-2**

ASSIGNMENT-III

Q 1 Mention some real world example of binary classification problem.	**BLT-4**	**CO-3**
Q 2 Write ten data analysis tools and explain it.	**BLT-2**	**CO-3**
Q 3 Write conjoint algorithm and what time is conjoint O'clock?	**BLT-2**	**CO-3**
Q 4 Write steps in developing conjoint analysis and what are the benefits of using its?	**BLT-2**	**CO-3**
Q 5 What is discriminant analysis? Explain with two examples.	**BLT-2**	**CO-3**

ASSIGNMENT-IV

Q 1.What is the difference between hierarchical and nonhierarchical cluster analysis?	**BLT-2**	**CO-4**
Q 2 Mention the types of multidimensional scaling.	**BLT-2**	**CO-4**
Q 3 Describe cluster analysis in details.	**BLT-2**	**CO-4**
Q 4 Write the Difference between principal analysis and factor analysis.	**BLT-1**	**CO-4**
Q 5 Mention the difference between oblique and orthogonal rotation.	**BLT-2**	**CO-4**

ASSIGNMENT-V

Q 1 Write the Difference between CHAID and CART.	**BLT-1**	**CO-5**
Q 2 Mention the advantages and disadvantages of decision tree.	**BLT-2**	**CO-5**
Q 3 What is the time series analysis? Explain it with suitable model.	**BLT-2**	**CO-5**
Q 4 Explain decision tree analysis and draw a decision tree.	**BLT-2,3**	**CO-5**
Q5 Explain under-determined, over-determined and just-determined in path diagram.	**BLT-3**	**CO-5**

*BLT: BLT shows the **Bloom's taxonomy** levels.

Department of Mechanical Engineering

II Year IV Semester

4ME1-02 Technical Communication

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-I

Q1. What is linguistic ability?	BLT-1	CO-1
Q2. How will you improve your listening and speaking skills?	BLT-1	CO-1
Q3. Explain the ABC of Technical Communication.	BLT-2	CO-1
Q4. Compare Professional Communication and Business Communication with Technical Communication.	BLT-3	CO-1
Q5. Describe the various Technical Communication skills in your own words.	BLT-2	CO-1

ASSIGNMENT-II

Q1. What is Note-making?	BLT-1	CO-2
Q2. Differentiate between Interpreting and Summarizing the Technical Text.	BLT-3	CO-2
Q3. What is Information Collection?	BLT-1	CO-2
Q4. Explain the process of Reading and Comprehending the Technical Instructions and Technical Manuals.	BLT-2	CO-2

ASSIGNMENT-III

Q1. Explain briefly the forms of Technical Discourse.	BLT-2	CO-3
Q2. Draft a job application for the post of Electrical Engineer in Gunjan Fabricators Pvt. Ltd Gurgaon. Also, enclose your Resume.	BLT-4	CO-3
Q3. Explain some Editing Strategies to achieve an appropriate Technical Style.	BLT-2	CO-3
Q4. What do you understand by Electronic Mail (e-mail)? Suggest some points to be kept in mind while writing an appropriate e-mail.	BLT-1	CO-3
Q5. What is Resume Writing?	BLT-1	CO-3

ASSIGNMENT-IV

Q1. Define a Technical Project Proposal.	BLT-1	CO-4
Q2. Draft a report on Water Conservation in Rajasthan.	BLT-4	CO-4
Q3. Discuss the general Guidelines to prepare a Good Technical Report.	BLT-2	CO-4
Q4. Describe the structure, characteristics and formats of Technical Project Proposals.	BLT-2	CO-4
Q5. Discuss the following various kinds of Proposals with their characteristics in detail. (a) Business Proposals (b) Research Proposals (c) Educational Proposals (d) Accreditation Proposals	BLT-2	CO-4

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Department of Mechanical Engineering
II Year III Sem.

3ME1-02: Technical Communication

Note: Each Assignment of Maximum marks10. All question carries equal marks.

ASSIGNMENT-V

Q1. Discuss the general Guidelines to prepare a Good Technical Report.	BLT-2	CO-5
Q2. Explain Technical Articles.	BLT-2	CO-5
Q3. Explain the following 8 parts of speech with definitions and Examples. (i) Noun (ii) Pronoun (iii) Adjective (iv)Verb (v)Adverb (vi)Preposition (vii)Conjunction (viii)Interjection	BLT-2	CO-5
Q4. Explain some Editing Strategies to achieve an appropriate Technical Style.	BLT-2	CO-5
Q5. Discuss the three main steps (Planning, Drafting and Writing) of Technical Writing.	BLT-2	CO-5

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Department of Mechanical Engineering

II Year IV Semester

4ME3-04 Digital Electronics

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-I

Q1 Define PN Junction diode. Draw the schematic symbol and V-I characteristics of it	**BLT-2**	**CO-1**
Q2 Define zener diode. Draw and explain schematic symbol and V-I characteristics of it.	**BLT-2**	**CO-1**
Q3 Explain avalanche breakdown and zener breakdown in zener diode.	**BLT-1**	**CO-1**
Q4 Difference between PNP and NPN transistor.	**BLT-2**	**CO-1**
Q5 Explain BJT as single stage CE amplifier.	**BLT-3**	**CO-1**

ASSIGNMENT **-II**

Q1 Explain inverting and non-inverting modes of Op-Amp	**BLT-3**	**CO-2**
Q2 Explain Op-Amp as an integrator	**BLT-2**	**CO-2**
Q3 Explain Op-Amp as comparator.	**BLT-1**	**CO-2**
Q4 Explain Op-Amp as a differentiator	**BLT-2**	**CO-2**
Q5 Explain Op-Amp as a summing amplifier.	**BLT-2**	**CO-2**

ASSIGNMENT **-III**

Q1 Explain the 555 timer IC and describe the functioning of 555 timer IC.	**BLT-2**	**CO-3**
Q2 Explain Barkhausen's's criteria for sustainable oscillations. What is the frequency for RC phase shift to produce RC phase shift oscillator	**BLT-2**	**CO-3**
Q3 Explain Wein bridge Oscillator. Draw its circuit diagram for wein bridge oscillator.	**BLT-2**	**CO-3**
Q4 What is the time constant of RC circuits.	**BLT-1**	**CO-3**
Q5 What are the three main operating modes of IC 555 timer	**BLT-2**	**CO-3**

ASSIGNMENT **-IV**

Q1Explain full adder using half adder	**BLT-2**	**CO-4**
Q2 Design 8*1 multiplexer with 4*1 multiplexer.	**BLT-2**	**CO-4**
Q3 Simplify f (A, B, C, D) = Σ (0,3,4,6,8,9,12,14,15) using K-Map.	**BLT-2**	**CO-4**
Q4 Describe JK flip flop and give its characteristic equation, excitation table and circuit diagram.	**BLT-1**	**CO-4**
Q5 Design 3-bit up/down synchronous counter using JK flip flop.	**BLT-2**	**CO-4**

ASSIGNMENT -V

Q1 What are amplitude and frequency modulation processes?	**BLT-1**	**CO-5**
Q2 What is the need of modulation. Explain it.	**BLT-1**	**CO-5**
Q3 What are the applications of frequency modulation.	**BLT-2**	**CO-5**
Q4 Explain the amplitude modulation with block diagram	**BLT-2**	**CO-5**
Q5 List different types of transmission media systems	**BLT-4**	**CO-5**

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Department of Mechanical Engineering

II Year IV Semester

4ME4-05: Fluid Mechanics and Fluid Machines

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-I

Q1. Discuss about pressure measuring system.	**BLT-2**	**CO-1**
Q2. Define: a. Absolute pressure b. Gauge Pressure	**BLT-1**	**CO-1**
Q3. Define Vacuum pressure.	**BLT-1**	**CO-1**
Q4. Write a detailed note on Manometers with diagram.	**BLT-2**	**CO-1**
Q5. Discuss about U tube differential manometer with diagram and calculate pressure difference.	**BLT-3**	**CO-1**

ASSIGNMENT-II

Q1. Water is flowing through a pipe having diameter of 20 cm and 10 cm at station 1 & 2 respectively. The rate of flow through pipe is 35 lit/s. The section 1 is 6m above the datum & section 2 is 4m above the datum. If the pressure of section 1 is 39.24 N/cm^2. Find the intensity of pressure at section 2.	**BLT-3**	**CO-2**
Q2. Water is flowing through a pipe having diameter 300mm and 200mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525N/cm^2 and the pressure at the upper end is 9.81N/cm^2. Determine the difference in datum head if the rate of flow through is 40lit/sec?	**BLT-3**	**CO-2**
Q3. In a pipe of diameter 350mm & the length 75m water is flowing in a V=2.8 m/s. Find the head due to friction.	**BLT-3**	**CO-2**
Q4. Write a detailed note on fundamental and derived quantities and draw table showing symbol and dimensions respectively.	**BLT-2**	**CO-2**
Q5. Find the expression for drag force on a smooth sphere of diameter D, moving with a uniform velocity V in a fluid of density ρ and dynamic viscosity μ .	**BLT-3**	**CO-2**

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Department of Mechanical Engineering

II Year IV Semester

4ME4-05: Fluid Mechanics and Fluid Machines

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-III

Q1.	State Buckingham's π-theorem. Why this theorem is considered superior over the Rayleigh's method for dimensional analysis?	**BLT-2**	**CO-3**
Q2.	What do you mean by dimensionless numbers? Name any four dimensionless numbers. Define and explain Reynold's number, Froude's number and Mach number. Derive expressions for any above two numbers.	**BLT-2**	**CO-3**
Q3.	A fluid of density ρ and viscosity μ, flows at an average velocity V through a circular pipe of diameter D. Show by dimensional analysis, that the shear stress at the pipe wall is given as. $$\tau_0 = \rho V^2 \phi \left[\frac{\rho V D}{\mu}\right]$$	**BLT-4**	**CO-3**
Q4.	The drag force exerted by a flowing fluid on a solid body depends upon the length of the body, L, velocity of flow V, density of fluid ρ, and viscosity μ. Find an expression for drag force using Buckingham's π-theorem.	**BLT-4**	**CO-3**
Q5.	The efficiency η of geometrically similar fans depends upon the mass density of air ρ, its viscosity μ, speed of fan N (revolutions per sec), diameter of blades D and discharge *Q*. Perform dimensional analysis. {Hint: Take D, N,p as repeating variables.	**BLT-4**	**CO-3**

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Department of Mechanical Engineering

II Year IV Semester

4ME4-05: Fluid Mechanics and Fluid Machines

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-IV

Q1.	Define and give example with diagram. a. Hydraulic machines b. Turbine c. Pump	**BLT-1**	**CO-4**
Q2.	Define a centrifugal pump. Explain the working of a single-stage centrifugal pump with sketches.	**BLT-1**	**CO-4**
Q3.	What do you mean by manometric efficiency and overall efficiency of a centrifugal pump?	**BLT-2**	**CO-4**
Q4.	A four-stage centrifugal pump has four identical impellers, keyed to the same shaft. The shaft is running at 400 rpm and the total manometric head developed by multistage pump is 40m. The discharge through the pump is 0.2 m^3/s. The vanes of each impeller are having outlet angle as 45 °. If the width and diameter of each impeller at outlet is 5 cm and 60 cm respectively. Find the manometric efficiency	**BLT-3**	**CO-4**
Q5.	The impeller of a centrifugal pump has an external diameter of 450mm and internal diameter of 200 mm and it runs at 1440 rpm. Assumng a constant radial flow through the impeller at 2.5m/s and that the vanes at exit are set back at an angle 25°. Determine: a. Inlet vane angle b. The angle, absolute velocity of water at exit makes with the tangent, and c. The work done per N of water.	**BLT-3**	**CO-4**

ASSIGNMENT-V

Q1.	Write detailed note on classification of hydraulic turbine.	**BLT-3**	**CO-5**
Q2.	Differentiate between: (a) The impulse and reaction turbines, (b) Radial and axial flow turbines, (c) Inward and outward radial flow turbines, (d) Kaplan and propeller turbines.	**BLT-3**	**CO-5**
Q3.	Obtain an expression for the work done per second by water on the runner of a pelton wheel. Hence derive an expression for maximum efficiency of the pelton wheel giving relationship between the jet speed and bucket speed.	**BLT-3**	**CO-5**
Q4.	Discuss various characteristic curves of hydraulic turbines.	**BLT-3**	**CO-5**
Q5.	A pelton wheel is revolving at a speed of 190 rpm and develops 5150.25kW when working under a head of 220 m with an overall efficiency of 80 %. Determine unit speed, unit discharge and unit power. The speed ratio for the turbine is given as 0.47. Find the speed, discharge and power when this turbine is working under a head of 140 m.	**BLT-3**	**CO-5**

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Department of Mechanical Engineering

II Year IV Semester

4ME4-06: Manufacturing Processes

Note: Each Assignment of Maximum marks10.All question carries equal marks.

ASSIGNMENT-I

Q1. Explain the types of casting defects with cause and remedy also draw diagram?	**BLT-2**	**CO-1**
Q2. What is pattern? How do we classify pattern? Explain in detail.	**BLT-2**	**CO-1**
Q3. What is the objective of gating system? Explain different element of gating system.	**BLT-1**	**CO-1**
Q4. How does moulding sand properties affect the casting process?	**BLT-2**	**CO-1**
Q5. Write short notes on casting defects	**BLT-3**	**CO-1**

ASSIGNMENT -**II**

Q1. Write short note on : i) Drop forging ii) Press forging	**BLT-3**	**CO-2**
Q2. What are the different types of die used in forging process also write the different material used for that?	**BLT-2**	**CO-2**
Q3. Name different types of rolling process also explain in detail any two types of rolling	**BLT-1**	**CO-2**
Q4. What is difference between the hot open die forging and hot close die forging	**BLT-2**	**CO-2**
Q5 Draw fig of different types of types of defects present or associated with the metal forming process	**BLT-2**	**CO-2**

ASSIGNMENT -**III**

Q1. What is blanking and piercing?	**BLT-2**	**CO-3**
Q2. What is trimming and nibbling?	**BLT-2**	**CO-3**
Q3. What is Parting and notching?	**BLT-2**	**CO-3**
Q4. What is principal of extrusion how it work on products how press tool work?	**BLT-1**	**CO-3**
Q5. How the wire drawing, tube drawing and deep drawing are different from each other explain?	**BLT-2**	**CO-3**

ASSIGNMENT -**IV**

Q1. What are major difference between Brazzing and soldering?	**BLT-2**	**CO-4**
Q2. With a neat sketch, explain metal arc welding process.	**BLT-2**	**CO-4**
Q 3 What are major difference between TIG and MIG?	**BLT-2**	**CO-4**
Q.4. write short note on submerged arc welding	**BLT-1**	**CO-4**
Q5. What are different types of electrodes for arc welding and material of that?	**BLT-2**	**CO-4**

ASSIGNMENT -V

Q.1 Classify the methods of powder production methods. Explain mechanical pulverization and electrolysis with fig.	**BLT-1**	**CO-5**
Q2. Give the principle of operation of powder metallurgy with its outline diagram briefly and explain the process.	**BLT-1**	**CO-5**
Q3 Write short note on (i) compaction (ii) Pre-sintering iii) sintering	**BLT-2**	**CO-5**
Q4. Explain Atomization and chemical reduction process for powder production.	**BLT-2**	**CO-5**
Q5. Write advantages and limitations of powder metallurgy also give its application.	**BLT-4**	**CO-5**

*BLT: BLT shows the **Bloom's taxonomy** levels.

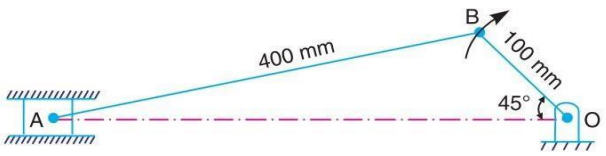
Department of Mechanical Engineering

II Year IV Semester

4ME4-07: Theory of Machine

Note: Each Assignment of Maximum marks10.All question carries equal marks.

Assignment -1

Q1	Explain Grubler's criterion for determining degree of freedom for mechanisms. Using Grubler's criterion for plane mechanism, prove that the minimum number of binary links in a constrained mechanism with simple hinges is four.	**CO-1**	**BT-1**	**(4)**
Q2	Sketch and describe the four bar chain mechanism. With its inversion.	**CO-1**	**BT-1**	**(4)**
Q3	Sketch and describe the working of two different types of quick return mechanisms. Give examples of their applications. Derive an expression for the ratio of times taken in forward and return stroke for one of these mechanisms.	**CO-1**	**BT-2**	**(4)**
Q4	Sketch and explain any two inversions of a double slider crank chain.	**CO-1**	**BT-1**	**(4)**
Q5	Locate all the instantaneous centres of the slider crank mechanism as shown in Fig. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s, find: 1. Velocity of the slider A, and 2. Angular velocity of the connecting rod AB. 	**CO-1**	**BT-3**	**(4)**

*BLT: BLT shows the **Bloom's taxonomy** levels.

Department of Mechanical Engineering

II Year IV Semester

4ME4-07: Theory of Machine

Note: Each Assignment of Maximum marks10.All question carries equal marks.

Assignment -2

Q1	Neglecting collar friction, from first principles, prove that the maximum efficiency of a square threaded screw moving in a nut:(1-sin ∅/1+sin∅). Where ∅ is the friction angle.	**CO-2**	**BT-1**	**(10)**
Q2	A truncated conical pivot of cone angle φ rotating at speed *N* supports a load W. The smallest and largest diameter of the pivot over the contact area are'd' and '*D*' respectively. Assuming uniform wear, derive the expression for the frictional torque.	**CO-2**	**BT-1**	**(10)**
Q3	A vertical screw with single start square threads 50 mm mean diameter and 12.5 mm pitch is raised against a load of 10 kN by means of a hand wheel, the boss of which is threaded to act as a nut. The axial load is taken up by a thrust collar which supports the wheel boss and has a mean diameter of 60 mm. If the coefficient of friction is 0.15for the screw and 0.18 for the collar and the tangential force applied by each hand to the wheel is 100 N ; find suitable diameter of the hand wheel.	**CO-2**	**BT-2**	**(10)**
Q4	An effort of 1500 N is required to just move a certain body up an inclined plane of angle 12º, force acting parallel to the plane. If the angle of inclination is increased to 15º, then the effort required is 1720 N. Find the weight of the body and the coefficientof friction.	**CO-2**	**BT-1**	**(10)**
Q5	A thrust shaft of a ship has 6 collars of 600 mm external diameter and 300 mm internal diameter. The total thrust from the propeller is 100 kN. If the coefficient of friction is 0.12 and speed of the engine 90 r.p.m., find the power absorbed in frictionat the thrust block, assuming **l.** Uniform Pressure and **2.** Uniform Wear.	**CO-2**	**BT-3**	**(10)**

*BLT: BLT shows the **Bloom's taxonomy** levels.

Department of Mechanical Engineering

II Year IV Semester

4ME4-07: Theory of Machine

Note: Each Assignment of Maximum marks10.All question carries equal marks

Assignment -3

Q1	What do you understand by gear train? Discuss the various types of gear train.	**CO-3**	**BT-1**
Q2	Derive the expression for the length of the arc of contact in a pair of meshed spur gears.	**CO-3**	**BT-1**
Q3	What are the forms of gear tooth. Explain.	**CO-3**	**BT-3**
Q4	A single reduction gear of 120kW with a pinion 250mm pitch circle diameter and speed 650 rpm is supported in bearings on either side. Calculate the total load due to the power transmitted , the pressure angle being 20^0.	**CO-3**	**BT-3**
Q5	A pair of gears having 40 and 20 teeth respectively, are rotating in mesh,the speed of the smaller being 2000r.p.m.Determine the velocity of sliding between the gear teeth faces at the point of engagement ,at the pitch point and at the point of disengagement if the smaller gear is driver. Assume that the gear teeth are 20^0 involute form, addendum length is 5 mm and the module is 5 mm. Also find the angle through which the pinion turns while any pair of teeth are in contact.	**CO-3**	**BT3**

Assignment -4

Q1	What do you understand by gyroscopic couple? Derive the formula for its magnitude.	**CO-4**	**BT-1**
Q2	Explain the application of gyroscopic principles to aircraft.	**CO-4**	**BT-1**
Q3	Describe the gyroscopic effect on naval ship.	**CO-4**	**BT-2**
Q4	Define the following terms: (a)Base Circle (b) Pitch Circle (c) Pressure angle (d) Stroke of the follower	**CO-4**	**BT-3**
Q5	A cam is to give the following motion to a knife edged follower: 1.Out stroke during 60^0 of cam rotation; 2 Dwell for next 30^0 of cam rotation; 3. Return stroke during next 60^0 of cam rotation, and 4. Dwell for the remaining 210^0 of cam rotation. The stroke of the follower is 40mm and the minimum radius of the cam is 50mm.The follower moves with uniform velocity during both outstroke and return strokes. Draw the profile of the cam when (a)the axis of the follower passes through the axis of the cam shaft and (b)the axis of the follower is offset by 20mm from the axis of the cam shaft.	**CO-4**	**BT-3**

*BLT: BLT shows the **Bloom's taxonomy** levels.

Department of Mechanical Engineering

II Year IV Semester

4ME4-07: Theory of Machine

Note: Each Assignment of Maximum marks10.All question carries equal marks

Assignment -5

Q1	What do you mean by static balancing and dynamic balancing? What are necessary conditioned to achieve them.	**CO-5**	**BT-1**
Q2	Explain primary and secondary unbalanced forces of reciprocating masses.	**CO-5**	**BT-1**
Q3	Mention the different cases of balancing of rotating mass.	**CO-5**	**BT-1**
Q5	Explain the terms: (a) Variation of tractive force (B) Swaying couple (C) Hammer blow	**CO-5**	**BT-1**
Q5	A shaft is rotating at a uniform angular speed. Four masses m_1,m_2,m_3 and m_4 of magnitudes 300kg., 450kg.,360 kg. and 390 kg. respectively are attached rigidly to the shaft. The masses are rotating in the same plane. The corresponding radii of rotation are 200mm,150mm,250mm and 300 mm. respectively. The angles made by these masses with horizontal are 0^0,45^0,12^0,225^0 respectively. Find: (i) The magnitude of the balancing mass and (ii) The position of the balancing mass if its radius of rotations is 200 mm.	**CO-5**	**BT-3**

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