

Hall Ticket Number :

R-20

Code: 20AC45T

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Managerial Economics & Financial Analysis**

(Common to EEE & ME )

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two mark**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |  | CO  | Blooms Level |
|--|-----|--------------|
| 1. Answer ALL the following short answer questions ( 5 X 2 = 10M )               |     |              |
| a) Explain Arc method for measurement of elasticity of demand.                   | CO1 | L2           |
| b) Define contribution. Explain any two formulas for calculation of contribution | CO2 | L1           |
| c) Explain any four types of costs?  | CO3 | L2           |
| d) What are the examples of oligopoly market?                                    | CO4 | L1           |
| e) What is the profitability index formula?                                      | CO5 | L1           |

**PART-B**

Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

**UNIT-I**

- |  | Marks | CO  | Blooms Level |
|--|-------|-----|--------------|
| 2. a) Define Managerial Economics. Explain its scope.                                | 6M    | CO1 | L1           |
| b) What do you understand by elasticity of demand? Explain the factors governing it. | 6M    | CO1 | L1           |

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Define Law of Demand. What are its exceptions? Explain.                       | 6M | CO1 | L1 |
| b) How managerial economics is related with 'accounting' and 'statistics'? Discuss. | 6M | CO1 | L1 |

**UNIT-II**

- |  |    |     |    |
|--|----|-----|----|
| 4. a) Consider the following data of a company for the year 2020: Sales Rs. 1,20,000, Fixed cost Rs. 25,000, Variable cost Rs. 45,000<br>Find: i. Contribution ii. Profit iii. BEP, and iv. Margin of safety | 6M | CO2 | L3 |
| b) Explain difference between ISO-quants and ISO-costs.  | 6M | CO2 | L3 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 5. a) Why does law of diminishing returns operate? Illustrate with assumed data. | 6M | CO2 | L1 |
| b) Define break-even point. Draw a break-even chart and explain its components.  | 6M | CO2 | L1 |

**UNIT-III**

- |   |    |     |    |
|---|----|-----|----|
| 6. a) Define Monopoly? How are price and output determined under monopoly?                          | 6M | CO3 | L1 |
| b) What do you mean by joint stock company? Enumerate the different types of Joint Stock companies. | 6M | CO3 | L1 |

**OR**

- |  |    |     |    |
|--|----|-----|----|
| 7. a) Differentiate between Monopolistic and Oligopoly Markets     | 6M | CO3 | L3 |
| b) Explain advantages and disadvantages of co-operative societies. | 6M | CO3 | L2 |

<b>UNIT-IV</b>
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8. a) Consider the case of the company with the following two investment alternatives each costing 9,00,000. The details of the cash inflows are as follows:

Year	Cash flows (in Rs.)	
	Project-1	Project- 2
1	3,00,000	6,00,000
2	5,00,000	4,00,000
3	6,00,000	3,00,000

The cost of capital is 10% per year. Which one will you choose under NPV Method? PV Factors @10% : 0.909, 0.826, 0.751

6M CO4 L4

- b) Define capital. Explain importance of capital in an organization

6M CO4 L1

**OR**

9. a) What is capital budgeting? Explain its needs and importance.

6M CO4 L1

- b) Define capital. Explain various types of capital

6M CO4 L1

<b>UNIT-V</b>
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10. a) What does a ratio analysis measure? Explain significance of ratio analysis.

6M CO5 L1

- b) Define Accounting. Explain objectives of accounting.

6M CO5 L1

**OR**

11. The Trail balance of Mr. Ramesh as on 31st March, 2020 revealed the following balances. Prepare trading, profit and loss A/c for the year ending 31st March, 2020 and a balance Sheet as on that date.

Particulars	Amount	Particulars	Amount
Plant & machinery	160,000	Capital account	200,000
Purchases	136,000	Sales	250,000
Sales returns	2,000	Purchase returns	6,550
Opening stock	60,000	Discount received	1,600
Discount allowed	700	Sundry creditors	50,000
Bank charges	150		
Sundry debtors	90,000		
Salaries	16,000		
Wages	20,000		
Insurance	1,500		
Rent and rates	4,000		
Advertisements	4,000		
Cash in hand	13,800		
	<b>508,150</b>		<b>508,150</b>

Adjustments:

- i) Closing Stock was valued at Rs. 70,000,
- ii) Outstanding Salaries Rs.1000, and
- iii) Prepaid insurance Rs.500

12M CO5 BL5

\*\*\* End \*\*\*

**Code: 20AC41T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

### Probability and Statistics

(Common to CE, ME, CSE and AI&DS)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two mark**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

#### PART-A

(Compulsory question)

- |   |    |              |
|---|----|--------------|
| <b>1. Answer ALL the following short answer questions ( 5 X 2 = 10M )</b>   | CO | Blooms Level |
| a) An engineering group receives e-mail requests for technical information from sales and service. The daily numbers of e0mails for six days are 11, 9, 17, 19, 4, 5. Find the mean and median. | 1  | L1           |
| b) Write the axioms of probability.   | 2  | L1           |
| c) Define Poisson distribution and state its constants.   | 3  | L1           |
| d) Discuss about one tail and two tail tests.   | 4  | L1           |
| e) Write the test statistic of paired sample test.  | 5  | L1           |

#### PART-B

Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks    CO    Blooms Level

**UNIT-I**

2. Find the value of mean, mode and median from the data given below:

Weight (kg)	93-97	98-102	103-107	108-112	113-117	118-122	123-127	128-132
Number of students	3	5	12	17	14	6	3	1

12M    1    L2

**OR**

3. a) Calculate the Karl Person's coefficient of correlation for the following ages (in years) of husbands and wives at the time of their marriage:

Age of Husband	23	27	28	28	28	30	30	33	35	38
Age of wife	18	20	22	27	21	29	27	29	28	29

6M    1    L3

- b) A test in statistics was taken by 7 students. The teacher ranked his pupils according to their academic achievement. The order of achievement from high to low, together with family income for each pupil, is given as follows:

Name	Rama	Krishna	Siva	Lava	Achyuta	Para	Pragni
Income (Rs '000)	8.7	4.2	5.7	8.2	20	18	17.5

6M    1    L3

**UNIT-II**

4. a) Define a discrete random variable and its probability distribution function. 6M    2    L3  
 b) If the probability density of a random variable is given by

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 \leq x < 2 \\ 0 & \text{elsewhere} \end{cases}$$

, find the probabilities that a random variable having

this probability density will take on a value

- (i) between 0.45 and 0.75 (ii) less than 0.6 (iii) greater than 1.0

6M    2    L3

**OR**

5. a) Given  $P(A) = 0.30, P(B) = 0.62, P(A \cap B) = 0.12$ , find  
 (i)  $P(A \cup B)$  (ii)  $P(\bar{A} \cap B)$  (iii)  $P(A \cap \bar{B})$  (iv)  $P(\bar{A} \cup \bar{B})$

4M    2    L2

- b) In a bolt factory, machines A, B, C manufacture respectively 25%, 35% and 40% of the total. Of their output 5%, 4%, 2% are known to be defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine A? 8M 2 L3

**UNIT-III**

6. a) If a coin is tossed 12 times, find the probability of getting  
 (i) at least two heads, (ii) at most 3 heads,  
 (iii) between 5 to 8 heads and (iv) all heads. 6M 3 L3
- b) The daily high temperature in a computer server room at the university can modeled by a normal distribution with mean 68.7 °F and standard deviation 1.2 °F. Find the probability that, on any given day, the high temperature will be  
 (i) between 68.3 and 70.3 °F , (ii) greater than 71.5 °F. 6M 3 L3

**OR**

7. a) Fit a Poisson distribution to the following data:

Number of deaths	0	1	2	3	4
Frequencies	122	60	15	2	1

6M 3 L3

- b) Find the probabilities that a random variable having the standard normal distribution will take on a value  
 (i) Between 0.87 and 1.28, (ii) between - 0.34 and 0.62,  
 (iii) Greater than -0.65 and (iv) less than -0.43 and greater than 0.43. 6M 3 L3

**UNIT-IV**

8. a) Define the following;  
 (I) Point estimation (ii) Interval estimation  
 (iii) Unbiased estimator (iv) More efficient unbiased estimator  
 (v) Null hypothesis and (vi) Alternative Hypothesis. 6M 4 L1
- b) The breaking strength of ropes produced by a manufacturer have mean 1800N and variance 1000N. By a new technique in the manufacturing process, it is claimed that the breaking strength can be increased. To test this claim a sample of 50 ropes is tested and found that the mean breaking strength is 1850N. Can we support the claim at (i) 0.05 and (ii) 0.01, level of significance? 6M 4 L3

**OR**

9. a) Discuss about the possible errors that are being occurred in sampling. 4M 4 L3
- b) A cigarette manufacturing firm claims that its brand A line of cigarettes outsells its brand B by 8%. If it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another sample of 100 smokers prefer brand B, test whether the 8% difference is a valid claim. 8M 4 L3

**UNIT-V**

10. To reduce the amount of recycled construction materials entering land fill, it is crushed for use in the base of roadways. Green engineering practices require that their strength, resiliency modulus, be accessed. Measurements on 6 specimens of recycled materials from two different locations produced the data:

Location-I	707	632	604	652	669	674
Location-II	552	554	484	630	648	610

Use the 0.05 level of significance to establish a difference in mean strength for the materials from two locations. Also construct a 99% confidence interval for the difference between means. 12M 5 L3

**OR**

11. Fit a Poisson distribution to the following data and test for goodness of fit at 0.05 level of significance.

x:	0	1	2	3	4
f:	419	352	154	56	19

12M 5 L3

\*\*\* End \*\*\*

Code: 20A341T

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

## Theory of Machines

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two mark**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

### PART-A

(Compulsory question)

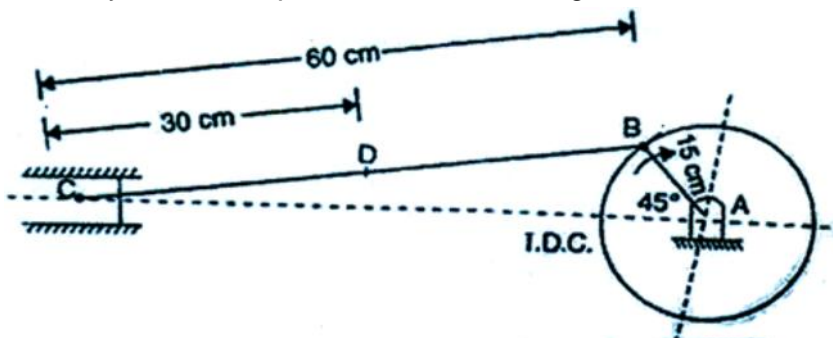
1. Answer **ALL** the following short answer questions (5 X 2 = 10M)

	CO	Blooms Level
a) Explain Grubler's criterion for determining degree of freedom for mechanisms.	1	L2
b) State Aronhold Kennedy's Theorem of three instantaneous centres.	2	L2
c) Explain the term interference and undercutting between two mating gears.	3	L2
d) What is the effect of partial balancing of the reciprocating parts in locomotives?	4	L2
e) In a spring mass system, if the mass is halved and the spring stiffness is doubled, what will be the value of the natural frequency of the system?	5	L2

### PART-B

Answer five questions by choosing one question from each unit (5 x 12 = 60 Marks)

	Marks	CO	Blooms Level
<b>UNIT-I</b>			
2. Explain the working of quick return motion mechanism. Also derive an equation for the ratio of times taken for forward and return strokes.	12M	1	L2
<b>OR</b>			
3. Explain with the help of neat sketch the working of Ackerman Steering Gear mechanism.	12M	1	L2
<b>UNIT-II</b>			
4. The crank of slider crank mechanism shown in Fig.1 is 15cm and the connecting rod is 60 cm long. The crank makes 300 r.p.m. in the clockwise direction. When it has turned $45^\circ$ from the inner dead centre position, determine: (i) velocity of slider C, (ii) Angular velocity of connecting rod and (iii) Linear velocity of the mid-point of the connecting rod.			



**Fig.1**

**OR**

5. An aeroplane runs at 600km/hr. the rotor of the engine weighs 4000N with radius of the gyration of 1 meter. The speed of the rotor is 300 r.p.m in anti clockwise direction when seen from rear side of the aero plane. If the plane takes a loop upwards in a curve of 100 meters radius, find : a) Gyroscopic couple developed; and b) Effects of reaction gyroscopic couple developed on the body of the aero plane.	12M	2	L3
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<b>UNIT-III</b>
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6. State and prove the law of gearing. Show that involute profile satisfies the conditions for correct gearing. 12M    3    L2

**OR**

7. Two shafts A and B are co-axial. A gear C (50 teeth) is rigidly mounted on shaft A. A compound gear D-E gears with C and an internal gear G. D has 20 teeth and gears with C and E has 35 teeth and gears with an internal gear G. The gear G is fixed and is concentric with the shaft axis. The compound gear D-E is mounted on a pin which projects from an arm keyed to the shaft B. Sketch the arrangement and find the number of teeth on internal gear G assuming that all gears have the same module. If the shaft A rotates at 110 r.p.m., find the speed of shaft B. 12M    3    L4

<b>UNIT-IV</b>
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8. A,B,C and D are four masses carried by rotating shaft at radii 100mm,125mm,200mm,150mm respectively. The planes which the mass revolve are speed 600mm apart and the mass of B, C and D are 10kg,5kg and 4kg respectively. Find the required mass A and the relative angular setting of four mass so that the shaft shall be in complete balance. 12M    4    L3

**OR**

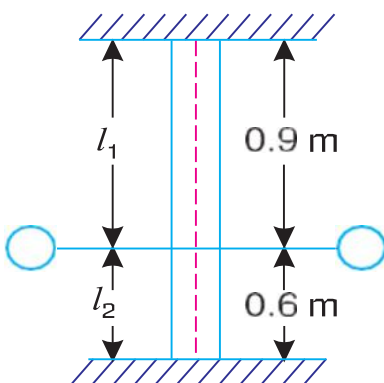
9. The following data apply to an outside cylinder uncoupled locomotive Mass of rotating parts per cylinder=3602 kg; Mass of reciprocating parts per cylinder =300 kg; Angle between of cracks= 90°; crank radius =0.3m; cylinder centre =1.75m; radius of balance masses 0.75m; Wheel centre=1.45m If whole of the rotating and two-thirds of reciprocating parts are to be balanced in planes of the driving wheels, find
1. Magnitude and angular positions of balanced masses,
  2. Speed in kilometers per hour at which the wheel will lift off the rails when the load on each driving wheel is 30KN and the diameter of tread of driving wheels is 1.8m, and
  3. Swaying couple at speed arrived at in (2) above. 12M    4    L4

<b>UNIT-V</b>
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10. A shaft 12.5mm diameter rotates in long bearings and a disc of mass 16 kg is secured to a shaft at the middle of its length. The span of the shaft between the bearings is 0.5m. The mass centre of the disc is 0.5mm from the axis of the shaft. Neglecting the mass of the shaft and taking  $E=200\text{GN/m}^2$ , find:
- a) Critical speed of rotation in r.p.m and
  - b) The range of speed over which the stress in the shaft due to bending will exceed  $120\text{MN/m}^2$ . Take the static deflection of the shaft beam fixed at both the ends. 12M    5    L4

**OR**

11. A flywheel is mounted on a vertical shaft as shown in Fig.2 The both ends of a shaft are fixed and its diameter is 50 mm. The flywheel has a mass of 500 kg and its radius of gyration is 0.5 m. Find the natural frequency of torsional vibrations, if the modulus of rigidity for the shaft material is  $80\text{GN/m}^2$ .

**Fig.2**

\*\*\* End \*\*\*

12M    5    L4

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**Code: 20A343T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Design of Machine Elements - I**  
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two mark**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |   |     |              |
|---|-----|--------------|
| 1. Answer ALL the following short answer questions ( 5 X 2 = 10M )  | CO  | Blooms Level |
| a) List any two factors that affect the selection of factor safety. | CO1 | L2           |
| b) What is notch sensitivity?                                       | CO2 | L2           |
| c) What is the nature of stress induced in parallel fillet welds?   | CO3 | L2           |
| d) Discuss the use of cotter joints.                                | CO4 | L2           |
| e) Explain the use of flexible couplings.                           | CO5 | L2           |

**PART-B**

Answer *five* questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

- |   | Marks | CO  | Blooms Level |
|---|-------|-----|--------------|
| <b>UNIT-I</b>   |       |     |              |
| 2. a) Explain the steps involved in design process (Shigley Model).   | 6M    | CO1 | L2           |
| b) A steel rod of circular cross section is subjected to a tensile load of 120 kN and a bending moment of 900 N-m. The yield stress for the material is 324 MPa and factor of safety is 3. Find the suitable diameter of the rod. | 6M    | CO1 | L4           |

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 3. A round rod is subjected to a bending moment of 2.4 kN-m and a torque of 1.8 kN-m. The yield stress for the material is 309 MPa. Taking factor of safety as 3, find the diameter of the rod as per the following theories of failure: |     |     |    |
| a) Maximum normal stress theory  |     |     |    |
| b) Maximum shear stress theory and   |     |     |    |
| c) Maximum distortion energy theory.   | 12M | CO1 | L6 |

**UNIT-II**

- |   |     |     |    |
|---|-----|-----|----|
| 4. What is stress concentration? What are the reasons for stress concentration? How to minimize it? | 12M | CO2 | L2 |
|---|-----|-----|----|

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 5. A round rod is subjected to a tensile load that fluctuates from 120 kN to 60 kN. It is made of steel having ultimate stress of 540 MPa, yield stress of 400 MPa and endurance stress in bending of 300 MPa. The load factor for axial load is 0.7. Surface and size factors may be taken as 0.9 and 0.8 respectively. Find suitable diameter of the rod taking factor of safety as 3. | 12M | CO2 | L6 |
|--|-----|-----|----|

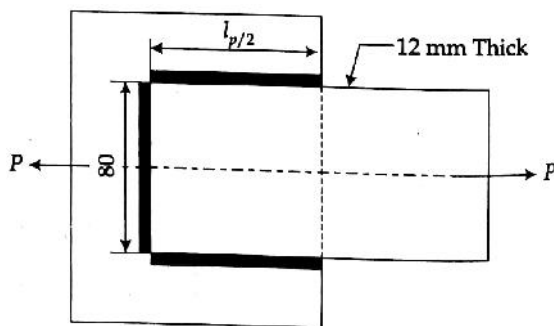
**UNIT-III**

6. A cover plate is bolted to a cylinder through 10 bolts. The inside diameter of the pressure vessel is 210 mm and the internal pressure is 3 MPa. Bolts are made of C40 steel ( $\sigma_y = 328.6$  MPa). Use factor of safety of 2. A copper gasket is used to make the joint leak proof. The initial load on the bolts is 60% of the axial load exerted by the pressure. The stiffness of the gasket is 0.6. Determine the size of bolts.

12M CO3 L6

**OR**

7. A 80 mm wide, 12 mm thick plate is welded to a support and is subjected to a tensile load of 210 kN as shown in the figure. Find the length of each parallel weld if the allowable tensile and shear stresses in the weld are 110 MPa and 75 MPa respectively.



12M CO3 L6

**UNIT-IV**

8. Select a rectangular parallel key to transmit 20 kW at 1000 rpm. The yield stress for the shaft and key material used is 300 MPa. Take FOS = 2.5

12M CO4 L6

**OR**

9. Design a knuckle joint to withstand a tensile load of 90 kN. The rods and pin are made of the same material with  $\sigma_t = 90$  MPa,  $\sigma_c = 150$  MPa and  $\tau = 60$  MPa.

12M CO4 L6

**UNIT-V**

10. A solid steel shaft transmits 9 kW at 900 rpm. It is simply supported on bearings at a distance of 1.2 m and carries a central load of 3 kN. Find the suitable diameter of the shaft if the yield stress for the shaft material is 360 MPa. Adopt a factor of safety of 3.

12M CO5 L6

**OR**

11. Design a rigid flange coupling to connect two shafts and transmit 37.5 kW at 180 rpm. The shaft, bolts and keys are made of steel with yield strength of 360 MPa. The factor of safety is 2.5. Flanges are made of grey cast iron FG 200 ( $\sigma_u = 200$  MPa) with FoS of 6. Assume ultimate shear strength as half of the ultimate tensile strength.

12M CO5 L6

\*\*\* End \*\*\*



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**Code: 20A342T**

II B.Tech. II Semester Supplementary Examinations Dec 2022 / Jan 2023

**Fluid Mechanics and Hydraulic Machines**

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two mark**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

(Compulsory question)

- |   | CO  | Blooms Level |
|---|-----|--------------|
| 1. Answer ALL the following short answer questions ( 5 X 2 = 10M )  | CO  | Level        |
| a) How does the dynamic viscosity of liquid and gases vary with temperature?  | CO1 | BL1          |
| b) Define Total Energy Line and Hydraulic Gradient Line.  | CO2 | BL2          |
| c) Find the force exerted by a jet of water of diameter 70mm on a stationary flat plate, normally with a velocity of 25m/s. | CO3 | BL2          |
| d) The working head of a water turbine is 400m and its speed is 33. What is the operating head?                             | CO4 | BL2          |
| e) Define the terms, Slip and Negative slip in reciprocating pumps  | CO5 | BL2          |

**PART-B**

Answer five questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

- |   | Marks | CO  | Blooms Level |
|---|-------|-----|--------------|
| <b>UNIT-I</b>   |       |     |              |
| 2. a) Define the basic law relating to the pressure in a static fluid. What is gauge pressure and atmospheric pressure?   | 6M    | CO1 | BL1          |
| b) Find the pressure represented by a column of (i) 12cm of water (ii) 7cm of oil of relative density 0.75.   | 6M    | CO1 | BL1          |
| <b>OR</b>   |       |     |              |
| 3. a) Explain Buoyancy, Buoyancy Force and Centre of Buoyancy   | 6M    | CO1 | BL1          |
| b) Define path line, streak line and the stream line. For what type of flow these lines are identical.  | 6M    | CO1 | BL2          |
| <b>UNIT-II</b>  |       |     |              |
| 4. a) Derive friction factor for the flow through the circular pipe by Darcy Weisbach equation?   | 6M    | CO2 | BL2          |
| b) Water under a pressure of $3.924 \times 10^{-3} \text{ N/m}^2$ is flowing through a 0.3 m pipe at the rate of $0.25 \text{ m}^3/\text{sec}$ . if the pipe is bent $135^\circ$ , find the magnitude and direction of the resultant force on the bend.   | 6M    | CO2 | BL2          |
| <b>OR</b>   |       |     |              |
| 5. A $45^\circ$ reducing bend is connected to a pipe line whose inlet and outlet diameters are 60 cm and 30 cm respectively. The water flow through the pipe is $0.6 \text{ m}^3/\text{s}$ . The pressure of the water at the inlet of the bend is $90 \text{ KN/m}^2$ . Find the total force exerted on the bend. The pipe line rests on the ground. | 12M   | CO2 | BL3          |

<b>UNIT-III</b>
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6. a) Find an expression for Force exerted by a fluid jet on stationary flat plate. 3M CO3 BL2
- b) An experiment was conducted in Hydraulic Machinery Laboratory and the following values were observed.
- Diameter of Pipe is 40 cm  
Diameter of Jet is 7.5 cm  
Velocity of Jet is 20 m/sec.
- Conditions: (i) Plate is at rest. (ii) Plate is moving in the same direction of flow with velocity 5m/sec. Based on the observations find out the thrust and work done/sec for condition (i) & (ii) And also calculate the efficiency of the jet for condition (ii) 9M CO3 BL3

**OR**

7. a) Derive an expression for force exerted by the jet of water on moving curved plate? 3M CO3 BL2
- b) A jet of water of diameter 100 mm strikes a curved plate at its centre with a velocity of 15 m/sec. The curved plate is moving with a velocity of 7 m/sec in the direction of the jet. The jet is deflected through an angle of  $150^\circ$ . Assuming the plate is smooth find (i) force exerted on the plate in the direction of the jet (ii) power of the jet (iii) efficiency 9M CO3 BL4

<b>UNIT-IV</b>
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8. a) Explain what is meant by unit quantities in turbines. 3M CO4 BL2
- b) A Kaplan turbine works under a head of 60m at a speed of 145rpm utilizing  $175\text{m}^3/\text{s}$  of water. Diameter of runner and hub are 5.60m & 3.20m. Turbine develops 82500 kW. Find i) flow ratio ii) speed ratio iii) overall efficiency iv) specific speed. 9M CO4 BL3

**OR**

9. A Hydro Electric power station is equipped with the Pelton wheels. The available head is 350m and each jet is supplied with  $0.48\text{ m}^3/\text{sec}$  of water. The buckets deflect through an angle of  $165^\circ$ . Find the power produced and the hydraulic efficiency. 12M CO4 BL4

<b>UNIT-V</b>
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10. a) Explain the working of reciprocating pump with neat sketch. 6M CO5 BL2
- b) Draw and discuss characteristic curves of a pump. 6M CO5 BL2
- OR**
11. a) A double acting reciprocating pump having piston area  $0.1\text{m}^2$  has a stroke of 0.30m long. The pump is discharging  $2.4\text{ m}^3$  of water per minute at 45rpm through a height of 10 m. Find the slip of the pump and power required to drive the pump. 9M CO5 BL4
- b) Differentiate between reciprocating pump and centrifugal pump. 3M CO5 BL2

\*\*\* End \*\*\*