

Code: 19A342T

II B.Tech. II Semester Supplementary Examinations February 2022

Fluid Mechanics and Hydraulic Machinery

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Explain the working of a Bourdon pressure gauge with a neat sketch.	7M	1	L2
b) An open tank contains water upto a depth of 1.5 m and above it an oil of specific gravity 0.8 for a depth of 2 m. Find the pressure intensity: i) at the interface of the two liquids, and ii) at the bottom of the tank	7M	1	L3
OR			
2. a) Explain with neat sketch of the following: i) Simple manometers ii) U tube manometers	6M	1	L2
b) A liquid is compressed in the cylinder having the volume of 0.0012 m ³ at a pressure of 690 N/cm ² . What would be the new pressure in order to make its volume 0.0119m ³ ? Assume bulk modulus of elasticity of the liquid 6.9×10 ⁴ N/cm ² .	8M	1	L3
UNIT-II			
3. a) What is a pitot tube? How will you determine the velocity at any point using pitot tube?	6M	2	L2
b) A crude oil of kinematic viscosity 0.4 stoke is flowing through a pipe of diameter 300 mm at a rate of 300 litres/sec. Find the head lost due to friction for a length of 50 m of a pipe.	8M	2	L3
OR			
4. a) State Bernoulli's theorem. Derive it from the first principle and also state the assumptions.	7M	2	L5,L6
b) An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the ratio of flow of oil of specific gravity 0.9 when the coefficient of discharge of the orifice meter is 0.64.	7M	2	L3
UNIT-III			
5. a) Discuss a pumped storage type of power station.	6M	3	L2
b) A turbine works with overall efficiency of 83%. The gross head and flow rate are 88 m and 20 m ³ /sec. The frictional losses in penstock are 4 m. Calculate the power developed.	8M	3	L3

OR

6. A jet of water having velocity of 45 m/s impinges without a shock on a series of vanes moving at 15 m/s, the direction of the motion of vanes being inclined at 20° to that of the jet. The relative velocity at outlet is 0.9 of that at inlet, and the absolute velocity of water at exit is normal to the motion of vanes. Find:
- vane angles at entrance and exit
 - work done on vanes per unit weight of water supplied by the jet and
 - the hydraulic efficiency
- 14M 3 L3

UNIT-IV

7. a) By means of a neat sketch, explain the governing mechanism of Francis Turbine. 7M 4 L2
- b) A turbine is to operate under a head of 25 m at 200 rpm. The discharge is 9 cumec. If the efficiency is 90%, determine the performance of the turbine under a head of 20 m. 7M 4 L3

OR

8. Design a single jet Pelton wheel to develop a power of 500 KW under a head of 160 m while running at 300 rpm. Assume $K_u = 0.45$, $C_v = 0.985$ and overall efficiency = 80%. Calculate the jet diameter, wheel diameter and number of buckets. Give a fully dimensional sketch of a bucket. 14 4 L3,L6

UNIT-V

9. a) Explain the construction, principle and working of a Reciprocating pump with a neat sketch. 7M 5 L2
- b) The internal and external diameters of the impeller of a centrifugal pump are 225 mm and 450 mm respectively. The pump is running at 1100 rpm. The vane angles at inlet and outlet are 25° and 35° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water 7M 5 L3

OR

10. a) Explain: Slip and Indicator Diagram. 6M 5 L2
- b) A single acting reciprocating pump has piston of diameter 150mm and stroke of length 250 mm. The piston makes 50 double strokes per minute. The suction and delivery heads are 5 m and 15 m respectively. Find
- discharge capacity of the pump in litres per minute;
 - force required to work the piston during the suction and delivery strokes if the efficiency of suction and delivery strokes are 60% and 75% respectively; and
 - power required to operate the pump
- 8M 5 L3

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Code: 19AE41T

II B.Tech. II Semester Supplementary Examinations February 2022

Managerial Economics and Financial Accounting

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) What is the importance and uses of Managerial Economics to Engineers? How can these concepts be used in the Manufacturing Sector?	7M	1	L1
b) Outline the objectives & uses of demand forecasting? How do you predict demand for Steel Manufacturing?	7M	1	L4
OR			
2. a) Describe the determinants of demand, Law of demand and its exceptions.	7M	1	L2
b) Explain with suitable diagrams, different kinds of Elasticity of demand.	7M	1	L2
UNIT-II			
3. a) What is marginal rate of technical substitution? How does it vary from marginal rate of substitution?	7M	2	L1
b) Define production. Analyse the Internal and External economies of large scale production.	7M	2	L4
OR			
4. a) Explain the importance of Cobb-Douglas production function.	7M	2	L2
b) State the determinants of cost. Distinguish between Marginal cost and Opportunity cost.	7M	2	L2
UNIT-III			
5. a) Define market. Highlight the difference between perfect and imperfect market.	7M	2	L2
b) Explain the price-output determination in Monopoly in long run and short run.	7M	2	L3
OR			
6. a) Outline the features, and advantages of sole proprietorship.	7M	2	L4
b) Explain the Objectives, features & limitations of Co-operative type of organisation.	7M	2	L3

UNIT-IV

7. a) Summarise the nature and scope of capital budgeting. 7M 3 L5
 b) What are the different Methods of evaluating capital budgeting projects? 7M 3 L1

OR

8. a) The initial cash outlay of a project is Rs.50, 000 and it generates cash inflows of Rs.20, 000, Rs.15, 000, Rs. 25, 000 and Rs.10, 000 in four years. Using profitability index method, appraise profitability of the proposed investment assuming 10% rate of discount. 14M 3 L2

UNIT-V

9. a) Determine Debt-Equity Ratio, Proprietary Ratio and Funds Proportion Ratios, with the help of following information:

Description	Amount Rs.
Equity Capital	10,00,000/-
Profit & Loss A/C(Profit)	5,00,000/-
Reserves & Surplus	3,00,000/
Premium on Issue of Shares & Debentures	2,50,000/
Debentures	30,00,000/
Long Term Fixed Deposits Accepted	5,00,000/
Long Term Bank Loans	15,00,000/
Provision for Dividend & Taxation	1,50,000/
Short Term Bank Loans	5,00,000/
Fixed Assets	45,75,000/

14M 3 L2

OR

10. a) What are activity ratios and solvency? Give two examples of each ratio 8M 4 L2
 b) Define financial accounting. What do you understand by 'double-entry' book keeping? 6M 4 L1

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R-19

Code: 19A341T

II B.Tech. II Semester Supplementary Examinations February 2022

Manufacturing Processes

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) On radiography a smooth spherical cavity appeared in the casting. Analyse the defect and suggest the remedial action	4M	CO1	BT4
b) Compare different types of gates with their relative merits, demerits and applications	10M	CO1	BT2
OR			
2. a) Compare investment casting and shell moulding (mention similarities and differences)	4M	CO1	BT2
b) A cubical casing solidifies in 10 sec. Find the solidification time of a cube 8 times heavier than former, made of same material cast under similar conditions	10M	CO1	BT3
UNIT-II			
3. a) What are the tests do you suggest to find the porosity inside the weld bead. Explain about one of them	4M	CO2	BT2
b) State and explain the types of flames in Oxy-Acetylene welding process with neat sketches along with their characteristics and applications	10M	CO2	BT1
OR			
4. a) Explain why Mild steel does not require preheating, whereas medium and high carbon steels are to be preheated. What is the significance of HAZ in weldment	4M	CO2	BT2
b) Explain the processes in brief and compare them during your explanation	10M	CO2	BT2
UNIT-III			
5. a) State the difference between blanking and piercing. Explain them with a suitable example	4M	CO3	BT2
b) What are various rolling defects? Explain them in detail	10M	CO3	BT1
OR			
6. a) Wire drawing is a cold working operation. Explain Why?	4M	CO3	BT2
b) A sheet of 25 mm thickness is rolled to 20 mm thickness in a single pass with the rolls of diameter 400mm. Find the contact length and bite angle. If the thickness cannot be reduced less than 18 mm in one pass what is the friction coefficient between the roll-sheet interfaces? If the plane strain flow stress of the material is 300 Mpa what is the load required per unit width of the sheet to reduce from 25mm to 18mm?	10M	CO3	BT3
UNIT-IV			
7. a) Compare forward and back word extrusion processes	4M	CO4	BT2
b) What are various types of forging processes? Explain them briefly	10M	CO4	BT1
OR			
8. a) What is cold shut in forging? State the reasons for the same	4M	CO4	BT2
b) Suggest a suitable process to produce collapsible tubes and explain the same	10M	CO4	BT3
UNIT-V			
9. a) What are the applications of plastic extrusion process	4M	CO5	BT1
b) Explain transfer moulding process with a neat sketch	10M	CO5	BT1
OR			
10. a) State the various steps to produce the components in 3D printing	4M	CO5	BT1
b) Explain the blow moulding process with a neat sketch	10M	CO5	BT1

END

Code: 19AC41T

II B.Tech. II Semester Supplementary Examinations February 2022

Numerical Methods & Probability and Statistics

(Common to CE & ME)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

Marks CO Blooms Level

UNIT-I

1. a) Apply Newton-Raphson method to find the real root of the equation $x^2 - 2 = 0$.

7M CO1 L3

b) Estimate the value of $f(1.7)$ and $f(3.6)$ from the following data

	$f(1.7)$	$f(3.6)$			
Value of x	0	1	2	3	4
Value of $f(x)$	1	1.5	2.2	3.1	4.6

7M CO1 L2

OR

2. a) Find the root of the equation $\cos x = x e^{-x}$ using the bisection method correct to three decimal places.

7M CO1 L1

b) Find the interpolating polynomial using Lagrange's formula and hence find $f(5)$ from the following data.

	0	2	3	6
Value of $f(x)$	648	704	729	792

7M CO1 L1

UNIT-II

3. a) Evaluate $\int_0^6 \frac{e^x}{1+x} dx$ by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule.

7M CO2 L3

b) Apply Taylor's method to find $y(0.1)$ and $y(0.2)$ to five decimals from $y' = x + y, y(0) = 0$.

7M CO2 L3

OR

4. a) Apply Runge-Kutta method of fourth order to find approximate value of y at $x = 0.1$, given that $\frac{dy}{dx} = 3e^{x^2} + 2y, y(0) = 0$ and $h = 0.1$.

7M CO2 L3

b) Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 1$ for the following data

	1.0	1.1	1.2	1.3	1.4	1.5
Value of y	5.691	6.213	6.932	7.535	8.214	9.234

7M CO2 L1

UNIT-III

5. a) X is a continuous random variable with probability density function given by $f(x) = \begin{cases} kx, & 0 \leq x < 1 \\ 2k, & 1 \leq x < 2 \\ -kx + 6k, & 2 \leq x < 3 \end{cases}$ then

Find i) k , ii) mean iii) variance

7M CO3 L1

b) Fit a binomial distribution to the following frequency distribution

	0	1	2	3	4	5	6
Frequency	13	25	52	58	32	16	4

7M CO3 L2

OR

6. a) A random variable x has the probability function

x	0	1	2	3	4	5	6
$P(X=x)$	$4k$	$3k$	$7k$	$8k$	$11k$	$12k$	

(i) Find the value of the k , (ii) Evaluate $P(X < 4)$, $P(X \geq 3)$.

7M CO3 L3

b) The mean and standard deviation of the marks obtained by 1000 students in an examination are respectively 34.4 and 16.5. Assuming the normality of the distribution, find the approximate number of students expected to obtain marks between 30 and 60.

7M CO3 L1

UNIT-IV

7. a) In a sample of 600 men from a certain city, 450 are found smokers. In another sample of 900 men from another city, 450 are smokers. Do the data indicate that the cities are significantly different with respect to the habit of smoking among men?

7M CO4 L4

b) Test the claim of a manufacturer that 95% of his 'stabilizers' confirm to ISI specifications if out of a random sample of 200 stabilizers produced by this manufacturer 18 were faulty. Use 0.05 level of significance.

7M CO4 L4

OR

8. a) A sample of 1000 days is taken from meteorological records of a certain district and 120 of them are found to be foggy. What are the probable limits to the percentage of foggy days in the district?

7M CO4 L4

b) In a random sample of 100 tube lights produced by company A, the mean lifetime (mlt) of tube light is 1190 hours with standard deviation of 90 hours. Also, in a random sample of 75 tube lights from company B the mean lifetime is 1230 hours with standard deviation of 120 hours. Is there a difference between the mean lifetimes of the two brands of tube lights at a significance level of 0.05?

7M CO4 L4

UNIT-V

9 The average weekly losses of man-hours due to strikes in an institute before and after a disciplinary program was implemented are as follows:

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

Is there reason to believe that the disciplinary program is effective at 0.05 level of significance?

14M CO5 L2

OR

10. Can we conclude that the two population variances are equal for the following data of post graduates passed out from a 'state' and 'private' university?

State:	8350	8260	8130	8340	8070	
Private:	7890	8140	7900	7950	7840	7920

14M CO5 L2

END

**ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, RAJAMPET
(AUTONOMOUS)**

II B.Tech II Semester **ME & CSE Mandatory Course Supplementary Examination**
19AC45T-Essence of India Traditional Knowledge

H.T. No:-										
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R19

Date:-04-03-2022

Duration: 2Hrs.

Answer any five questions from the following.

5X20=100 Marks

	Marks	Course Outcomes	Bloom's Level
1 Explain the characteristic features which contribute to fundamental unity of India?	20M	CO1	L2
2 Bring out the significance of Vedas, and briefly explain types of four Upvedas?	20M	CO2	L2
3 Briefly sketch the inventions and discoveries of Indian sages in ancient India?	20M	CO3	L1
4 How the characteristic features of Indian way of life show impact in the modern era?	20M	CO1	L2
5 How Traditional practices like Yoga and Pranayama play an important role in the modern world?	20M	CO3	L2
6 Discuss in detail the following significant Indian art forms a) Architecture b) Paintings	20M	CO2	L2
7 Write the relevance of Science and Spirituality in the current Technical world?	20M	CO3	L1
8 Describe different elegant Indian Dance forms which traditionally exist in India?	20M	CO4	L1

Code: 19A344T

II B.Tech. II Semester Supplementary Examinations February 2022

Applied Thermodynamics-I

(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Derive an equation for air-standard efficiency of a Diesel cycle.	7M	1	L2
b) For the same compression ratio and heat input, which cycle – Otto or Diesel or Dual – will have the highest efficiency? Explain with the help of P-V and T-S diagrams.	7M	1	L4
OR			
2. a) Give the comparison of air-standard and fuel-air cycles.	7M	1	L2
b) A Diesel engine has a compression ratio of 16 and cut-off takes place at 4% of the stroke. Find the air-standard efficiency.	7M	1	L3
UNIT-II			
3. a) How are heat engines classified? Give their relative advantages & disadvantages	7M	2	L2
b) What is the effect of fuel-air ratio on thermal efficiency, maximum power and maximum temperature in an I.C. engine?	7M	2	L4
OR			
4. a) Give the comparison of S.I and C.I engines.	7M	2	L1
b) What is the purpose of lubrication in mechanical systems and explain what type of lubrication system is being used in modern-day car engines.	7M	2	L3
UNIT-III			
5. a) Explain the phenomenon of knock in S.I. Engines.	7M	3	L2
b) What are the different types of combustion chambers used in C.I. Engines? Explain with the help of simple diagrams.	7M	3	L1
OR			
6. a) What are the factors that influence the flame speed in an engine cylinder? Explain briefly.	7M	3	L2
b) Discuss the important qualities of fuels used in SI and CI engines.	7M	3	L1
UNIT-IV			
7. A four-stroke cycle gas engine has a bore of 20 cm and a stroke of 40 cm. The compression ratio is 8. In a test on the engine the indicated mean effective pressure is 5 bar, the air to gas ratio is 5:1 and the calorific value of the gas is 12 kJ/m ³ at NTP. At the beginning of the compression stroke the temperature is 75°C and the pressure is 1 bar. Neglecting residual gases, determine the indicated power, thermal efficiency and the relative efficiency of the engine at 225 rpm.	14M	4	L3
OR			
8. a) Give the comparison of various methods used to find friction power.	7M	4	L1
b) Name different methods of measurement of air consumption in an engine and explain any one of them in detail.	7M	4	L1
UNIT-V			
9. a) Discuss the relative advantages and disadvantages of Reciprocating and Centrifugal compressors.	7M	5	L2
b) Derive, starting from the fundamentals, an expression for adiabatic efficiency of a reciprocating compressor.	7M	5	L2
OR			
10. a) Explain the working principle of an axial flow compressor. Give its advantages and applications.	7M	5	L2
b) Discuss the effect of inter-cooling in multi-stage compressors.	7M	5	L2

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R-19

Code: 19A343T

II B.Tech. II Semester Supplementary Examinations February 2022

Dynamics of Machinery
(Mechanical Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

	Marks	CO	Blooms Level
UNIT-I			
1. a) Derive from first principles an expression for the friction moment of a conical pivot assuming (i) Uniform pressure, and (ii) Uniform wear.	7M	1	L2, L3, L4
b) 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 friction at the thrust block, assuming 1. uniform pressure; and 2. Uniform wear.	7M	1	L2, L3, L4
OR			
2. a) Describe with a neat sketch the working of a single plate friction clutch.	7M	1	L2, L3, L4
b) A single plate clutch, with both sides effective, has outer and inner diameters 300mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 0.1 N/mm ² . If the coefficient of friction is 0.3, determine the power transmitted by a clutch at a speed 2500 r.p.m.	7M	1	L2, L3, L4
UNIT-II			
3. a) Describe the construction and operation of a prony brake or rope brake absorption dynamometer.	7M	2	
b) A band brake acts on the 3/4th of circumference of a drum of 450 mm diameter which is keyed to the shaft. The band brake provides a braking torque of 225 N-m. One end of the band is attached to a fulcrum pin of the lever and the other end to a pin 100 mm from the fulcrum. If the operating force is applied at 500 mm from the fulcrum and the coefficient of friction is 0.25, find the operating force when the drum rotates in the (i) anticlockwise direction, and (ii) clockwise direction.	7M	2	L2, L3, L4
OR			
4. a) Explain the application of gyroscopic principles to aircrafts.	4M	2	L2, L3, L4
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 r.p.m. clockwise when looking from stern. Determine the gyroscopic couple and its effect upon the ship: i. When the ship is steering to the left on a curve of 100m radius at a speed of 36km/h. ii. When the ship is pitching in a simple harmonic motion, the bow falling with its maximum velocity. The period of pitching is 40 seconds and the total angular displacement between the two extreme positions of pitching is 12 degrees.	10M	2	L2, L3, L4
UNIT-III			
5. a) Explain the turning moment diagram of a four stroke cycle internal combustion engine.	7M	3	L1, L2, L3
b) A horizontal cross compound steam engine develops 300 kW at 90 r.p.m. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within ± 0.5% of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 metres.	7M	3	L1, L2, L3

OR

6. a) Define and explain the following terms relating to governors :
 i. Stability, ii. Sensitiveness, iii. Isochronism, and iv. Hunting. 4M 3 L1, L2, L3
- b) A governor of the Proell type has each arm 250 mm long. The pivots of the upper and lower arms are 25 mm from the axis. The central load acting on the sleeve has a mass of 25 kg and the each rotating ball has a mass of 3.2 kg. When the governor sleeve is in mid-position, the extension link of the lower arm is vertical and the radius of the path of rotation of the masses is 175 mm. The vertical height of the governor is 200 mm. If the governor speed is 160 r.p.m. when in mid-position, find : 1. length of the extension link; and 2. tension in the upper arm. 10M 3 L1, L2, L3
- UNIT-IV**
7. a) Explain clearly the terms 'static balancing' and 'dynamic balancing'. State the necessary conditions to achieve them. 4M 4 L4, L5
- b) A shaft carries four masses in parallel planes A, B, C and D in this order along its length. The masses at B and C are 18 kg and 12.5 kg respectively, and each has an eccentricity of 60 mm. The masses at A and D have an eccentricity of 80 mm. The angle between the masses at B and C is 100° and that between the masses at B and A is 190° , both being measured in the same direction. The axial distance between the planes A and B is 100 mm and that between B and C is 200 mm. If the shaft is in complete dynamic balance, determine :
 i. The magnitude of the masses at A and D ; ii. the distance between planes A and D ; and iii. the angular position of the mass at D. 10M 4 L4, L5
- OR**
8. a) Explain why only a part of the unbalanced force due to reciprocating masses is balanced by revolving mass. 4M 4 L4, L5
- b) 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 : 1. the fraction of the reciprocating masses to be balanced, if the hammer blow is not to exceed 46kN at 96.5 km. p.h. ; 2. the variation in tractive effort ; and 3. the maximum swaying couple. 10M 4 L4, L5
- UNIT-V**
9. a) Define, in short, free vibrations, forced vibrations and damped vibrations. 7M 5 L1, L2, L3
- b) A shaft 50 mm diameter and 3 metres long is simply supported at the ends and carries three loads of 1000 N, 1500 N and 750 N at 1 m, 2 m and 2.5 m from the left support. The Young's modulus for shaft material is 200 GN/m². Find the frequency of transverse vibration. 7M 5 L1, L2, L3
- OR**
10. a) Derive an expression for the frequency of free torsional vibrations for a shaft fixed at one end and carrying load at free end. 7M 5 L1, L2, L3
- b) A flywheel is mounted on a vertical shaft as shown in Fig 24.2. 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 GN/m². 7M 5 L1, L2, L3

END