Code: 5G542

II B.Tech. II Semester Supplementary Examinations December 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)
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		Marks	CO	BL

UNIT–I

1.	Calculate the specific weight, specific mass, specific volume and specific gravity of a liquid having a volume of 6 m^3 and weight of 44 KN.	14M	CO1	L3

OR

2.	What are the different types of fluid flow? Explain.	14M	CO1	L1

UNIT–II

3.	State the assumptions made in the derivation of Bernoulli's equation and hence derive the Bernoulli's equation.	14M	CO2	L2

OR

4.	A pipe of diameter 40 cm carries water at a velocity of 25 m/s. The pressures at the point A and B are given as 29.4 N/cm^2 and 22.56N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.	14M	CO2	L3

UNIT–III

5.	Derive the expressions for force and work done per second by the jet when it strikes a flat plate, inclined Plate, curved plate moving in the direction of the jet.	14M	CO3	L2

OR

6.	What are the radial vanes? What are the velocity triangles? What are the uses of their drawing for a typical case of a jet striking a moving plate?	14M	CO3	L2

UNIT–IV

7.	Explain the different types of the Efficiencies of a turbine.	14M	CO4	L2

OR

8.	With a neat sketch explain the working principle of Pelton wheel.	14M	CO4	L2

UNIT–V

9.	A single acting reciprocating pump has a plunger of diameter 0.3m and stroke of length 0.4m. If the speed of the pump is 60 rpm and coefficient of discharge is 0.97, determine the percentage slip and actual discharge of the pump.	14M	CO5	L3

OR

10.	Explain following i) Main characteristic curves ii) Operating characteristic curves iii) Muschel curves	14M	CO5	L2

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Code: 5G543

II B.Tech. II Semester Supplementary Examinations December 2022
Kinematics 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)*

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UNIT–I

1. 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   14M

OR

2. Write notes on complete and incomplete constraints in lower and higher pairs, illustrating your answer with neat sketches.   14M

UNIT–II

3. In the mechanism shown in Fig, the slider C is moving to the right with a velocity of 1 m/s and an acceleration of 2.5 m/s^2. The dimensions of various links are AB=3m inclined at 45° with the vertical and BC = 1.5 m inclined at 45° with the horizontal. Determine: a. The magnitude of vertical and horizontal component of the acceleration of the point B, and b. the angular acceleration of the links AB and BC.

14M
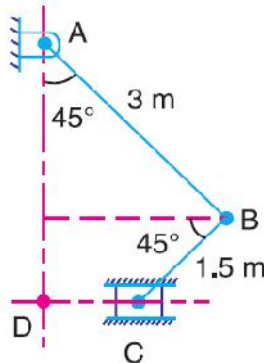
OR

4. In a four bar chain ABCD, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of link CD when angle BAD = 60°.   14M

UNIT–III

5. a) Sketch a Paucellier mechanism. Show that it can be used to trace a straight line.   7M

   b) What is a Scott-Russel mechanism? What is its limitation? How it is modified?   7M

OR

6. Derive an expression for the velocity of the driven shaft in a Hook's coupling   14M

UNIT–IV

7. Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find :
   a. The angle turned through by pinion when one pair of teeth is in mesh ; and
   b. The maximum velocity of sliding.   14M

OR

8. A pair of gear has 16 teeth and 18 teeth, a module 12.5 mm an addendum 12.5 mm and a pressure angle 14.5°. Prove that gears have interference. Determine the minimum number of teeth and the velocity ratio to avoid interference.   14M

UNIT–V

9. A cam with 30 mm minimum radius is rotating clock wise at 1200 rpm to give the following motion to a roller follower of 20 mm radius.
   i)   Lift = 25 mm
   ii) Follower rise during 120° cam rotation with simple harmonic motion.
   iii) Follower to dwell for 60°cam rotation.
   iv) Follower to return during 90° cam rotation with uniform acceleration and deceleration.
   v)   Follower to dwell for remaining period.
   Construct the profile of the cam and determine the maximum velocity and acceleration during rise and return.   14M

OR

10. Explain with sketches the different types of cams and followers   14M

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Code: 5GC42

II B.Tech. II Semester Supplementary Examinations December 2022
Probability & Statistics
(Common to CE, ME & CSE)

Max. Marks: 70   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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		Marks	CO	BL

UNIT–I

1. If $P(A) =1/ 4$, $P(B)= 1/ 3$ and $P(A \cup B)=1/ 2$ then find $P(A/ B)$, $P(B/A)$, $P (A \cap B')$ and $P (A /B')$. — 14M 1 L2

OR

2. State and prove Baye's theorem — 14M 1 L2

UNIT–II

3. Ten coins are throw simultaneously. Find the probability of getting at least (i) seven heads (ii) six heads — 14M 2 L1

OR

4. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two individuals will get a bad reaction. — 14M 2 L4

UNIT–III

5. If we can assert with 95% that the maximum error is 0.05 and P is 0.2. Find the size of the sample. — 14M 3 L2

OR

6. Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13,14. — 14M 3 L2

UNIT–IV

7. A random sample of 10 boys had the following I.Qs: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. Do these data support the assumption of population mean I.Q of 100? — 14M 4 L4

OR

8. A random sample of 100 recorded deaths in a country showed an average life span of 71.8 years. Assuming a population standard deviation of 8.9 years, does this seem to indicate that the mean life span today is greater than 70 years? Use a 0.05 level of significance. — 14M 4 L4

UNIT–V

9. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, Test whether the two populations have the same variance

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

14M 4 L4

OR

10. 4 coins were tossed 160 times and the following results were obtained,

No, of Heads	0	1	2	3	4
Frequency	17	52	54	31	6

Under the assumption that coins are unbiased, find the expected frequencies of 0,1,2,3,4 heads and test the goodness of fit for =0.05 — 14M 4 L4
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R-15

Code: 5G541

II B.Tech. II Semester Supplementary Examinations December 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)

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		Marks	CO	BL

UNIT–I

| 1. | With the help of P-V and T-S diagrams explain OTTO cycle and derive an expression for air standard efficiency. | 14M | CO1 | L2 |

OR

2. a)	Elaborate the following.			
	i) Exhaust blow down loss ii) Loss due to rubbing friction	6M	CO1	L2
b)	Explain about Time loss factor and Heat loss factor with suitable diagrams.	8M	CO1	L2

UNIT–II

| 3. a) | Discuss with a neat sketch, the working principle of carburetor and explain its Components. | 7M | CO2 | L2 |
| b) | What are different fuel injection systems for C.I engines? Explain any one? | 7M | CO2 | L1 |

OR

4. a)	Discuss about thermostat cooling system with a neat diagram.	6M	CO2	L2
b)	Write short notes on			
	(i) Solid Injection System, (ii) Wet sump Lubrication System	8M	CO2	L2

UNIT–III

| 5. | Describe with suitable sketches the combustion phenomenon in S.I engines and explain the two phases of combustion. | 14M | CO3 | L2 |

OR

| 6. a) | Write notes on (i) fuel rating and (ii) anti-know additives. | 7M | CO3 | L2 |
| b) | List out the requirements of good combustion chamber in SI engines. | 7M | CO3 | L2 |

UNIT–IV

| 7. | A rope brake was used to measure the brake power of a single cylinder 4-stroke petrol engine. It was found that the torque due to brake load is 175 N-m and the engine runs at 500 rpm. Determine the brake power developed by the engine? | 14M | CO4 | L3 |

OR

| 8. | List out various methods for measurement of friction power and explain Morse method of determination of friction power. | 14M | CO4 | L1 |

UNIT–V

| 9. | Derive an expression for the isothermal efficiencies of a reciprocating compressor in terms of the pressure ratio. | 14M | CO5 | L6 |

OR

| 10. a) | List the various types of rotary compressors? | 7M | CO5 | L1 |
| b) | Discuss with a neat sketch, the working of a roots blower. | 7M | CO5 | L2 |

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