Code: 7G542

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)
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Marks

		UNIT–I	
1.	a)	Define stream line and streak line. Derive the continuity equation for one dimensional flow	8M
	b)	Distinguish between: i). steady and Un-steady flow. ii). Uniform and Non-uniform flow. iii) Compressible and incompressible flow.	6M
		OR	
2.	a)	Define path line and stream tube with examples?	6M
	b)	Water flow through a pipe AB 1.2m diameter at3m/s and then passes through a pipe BC 1.5m diameter. At C, the pipe branches. Branch CS is 0.8m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.	8M
		UNIT–II	
3.	a)	State the Assumptions made in the derivation of Bernoulli's equation.	4M
	b)	A 20 cm diameter pipe has a 90^0 bend (to the right) in the horizontal plane. When a discharge of 150 lit/sec of oil (S = 0.8) is sent in this pipe, the pressure at the beginning of the bend is found to be 0.5 m of oil. Estimate the resultant force exerted by the oil on the bend.	10M
		OR	
4.		Derive Bernoulli's equation and state the assumptions made in it?	14M
		UNIT–III	
5.	a)	What do you understand by pumped storage type of power station? What are its merits and demerits when compared with other types?	4M
	b)	What is a run off river plant? What are the different parts and arrangements of such plants?	10M
		OR	
6.	a)	Enumerate the elements of hydroelectric power plant with a neat sketch and briefly explain each element?	10M
	b)	Differentiate the catchment area and reservoir?	4M
		UNIT–IV	
7.	a)	Define a turbine and bring out the differences between reaction turbine and impulse turbine?	7M
	b)	What is a draft tube? What are the functions of draft tube in a Reaction turbine?	7M
		OR	
8.	a)	Define the hydraulic efficiency, overall efficiency and mechanical efficiencies of a turbine?	6M
	b)	A Pelton wheel has a mean bucket speed of 12m /sec and is supplied with water at a rate of 750 lit/sec under a head of 35m. If the bucket deflects the jet through an angle of 160^0, find the power developed by the turbine and its hydraulic efficiency. Take the Cv as 0.98.Neglect the friction in the bucket	8M
		UNIT–V	
9.	a)	What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump?	6M
	b)	Draw and discuss the operating characteristic curves of centrifugal pump?	8M
		OR	
10.	a)	Describe multistage centrifugal pumps with i) impellers in series ii) impellers in parallel	6M
	b)	A one-fifth scale model of a pump was tested in a laboratory at 100r.p.m. The head developed and the power input at the best efficiency point was found to be 8 m and 30kW respectively. If the prototype pump has to work against a head of 25 m, determine its working speed, the power required to drive it and the ratio of the flow rates handled by the two pumps.	8M

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R-17

Code: 7G543

II B.Tech. II Semester Supplementary Examinations February 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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|		Marks	CO	Blooms Level

UNIT–I

1. What do you mean by inversion of mechanism? Explain with sketches all inversions of quadric cycle chain.   14M

OR

2. Sketch and describe the four bar chain mechanism. Why it is considered to be the basic chain?   14M
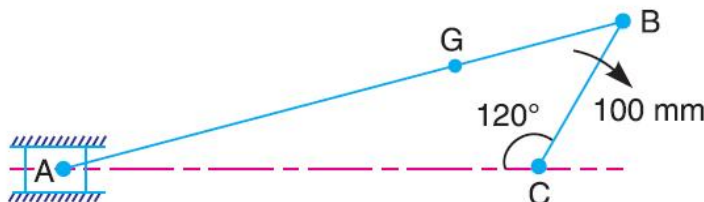
UNIT–II

3. In a pin jointed four bar mechanism, as shown in Fig, AB = 300 mm, BC = CD = 360 mm, and AD = 600 mm. The angle BAD = 60°. The crank AB rotates uniformly at 100 r.p.m. Locate all the instantaneous centres and find the angular velocity of the link BC.
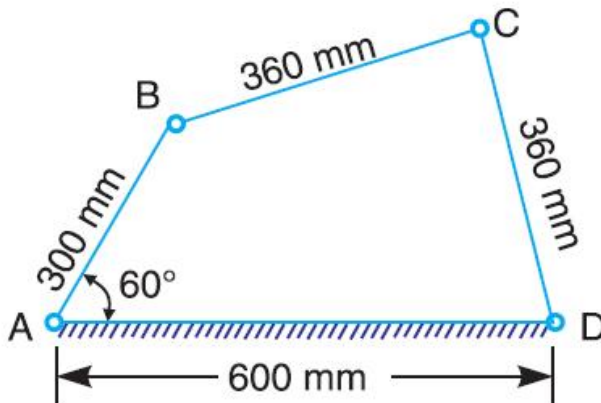
14M

OR

4. An engine mechanism is shown in Fig. The crank CB = 100 mm and the connecting rod BA = 300 mm with centre of gravity G, 100 mm from B. In the position shown, the crankshaft has a speed of 75 rad/s and an angular acceleration of 1200 rad/s^2. Find:1. velocity of G and angular velocity of AB, and 2. acceleration of G and angular acceleration of AB.

14M

UNIT–III

5. Sketch the Hart's straight line motion mechanism and prove that the tracing point 'P' describes a straight line path. 14M

OR

6. Show with sketch how pantograph is used to trace the path to a larger or smaller scale of a given path. 14M

UNIT–IV

7. Calculate (i) length of path of contact, (ii) arc of contact and (iii) the contact ratio when a pinion having 23 teeth drives a gear having teeth 57. The profile of the gears is involute with pressure angle 20º, module 8 mm and addendum equal to one module. 14M

OR

8. Two mating gears with 6 mm module have 30 teeth and 75 teeth. The addendum is standard one module. Pressure angle is 20º. Find: i) pitch diameters, ii) center distance iii) length of path of contact, iv) length of arc of contact and v) contact ratio. 14M

UNIT–V

9. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower. 14M

OR

10. Draw the displacement, velocity and acceleration diagrams for a follower when it moves with uniform acceleration and retardation. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower. 14M

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II B.Tech. I Semester Supplementary Examinations February 2022
Mechanics of Solids
(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 | Blooms Level |

UNIT–I

1. a) Explain various types of stresses and strains. **7M**

   b) **A** steel rod, 20 mm diameter and 800 m long, is rigidly attached to an aluminium rod, 40 mm diameter and 1 m long, as shown in Fig. The combination is subjected to a tensile load of 40 kN. Find the stress in the materials and the total elongation of the bar. *E* for steel = 200 GPa, *E* for aluminium = 70 GPa.


   7M
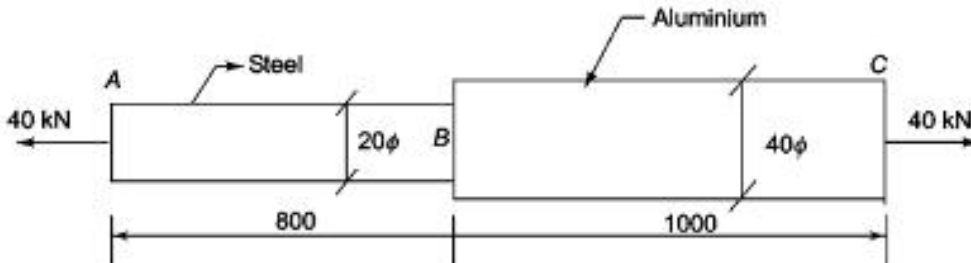
OR

2. a) Derive the relationship between young's modulus, modulus of rigidity and bulk modulus. **7M**

   b) A bar of 20mm diameter is tested in tension it is observed that when a lead of 40KN is applied the extension measured over a gauge length of 200mm us 0.12mm&contraction in diameter is 0.0036mm. Find poisson's ratio, young's modulus &bulk modulus &v rigidity modulus. **7M**

UNIT–II

3. a) Define the following :
   i. Bending Moment.   ii. Shear force. Iii. Point of contraflexure. **6M**

   b) A cantilever of length 2 m carries a 1 kN/m run over a length of 1.5 m from the free end. Draw the shear force and bending moment diagrams for the cantilever. **8M**

OR

4. Draw shear force and bending moment diagram for the beam shown in Figure
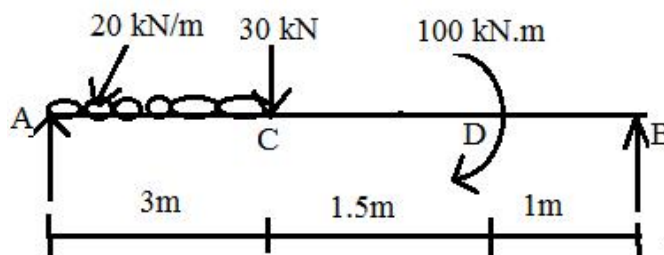
   14M

UNIT–III

5. State the assumption in theory of simple bending. And derive the equation

$$\frac{E}{R} = \frac{M}{I} = \frac{f}{y}$$

14M

OR

6. a) Derive the section modules for (i) rectangular section and (ii) circular section

6M

b) A timber beam 120m wide and 185mm deep supports a u.d.l of intensity w KN/m length over a span of 2.7m. If the safe stresses are 29Mpa in bending and 3Mpa in shear, calculate the safe intensity of the load which can be supported by the beam.
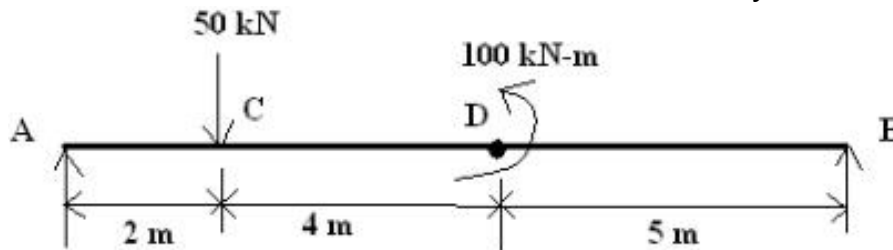
8M

UNIT–IV

7. a) Define Macaulay's method? And find out Deflection of a simply supported beam with an Eccentric point load

7M

b) A simply supported of 11 m length is loaded as shown in Figure. Determine the deflection under the load at point C and maximum deflection. Take young's modulus as 200 GPa and moment of inertia as 20×10^7 mm^4. Use Macaulay's method.

7M

OR

8. A rectangular reinforced concrete simply supported beam of length 2 m and cross section 100 mm x 200 mm is carrying an uniformly distributed load of 10 kN/m through its span. Find the maximum slope and deflection. Take E=2 x 10^4 N/mm^2.

14M

UNIT–V

9. What are the stresses induced in the thin cylindrical shell subjected to internal pressure? Explain and derive them.

14M

OR

10. A thin cylindrical shell of inside diameter 1.5 m is made of 10 mm thick steel plate. It is of 4 m length and is closed at its both ends. The shell is subjected to an internal fluid pressure of 2 MPa. Determine the change in length, the change in diameter, the change in volume, and circumferential and longitudinal stresses induced in the cylinder. Take modulus of elasticity of the steel is 210 GPa and the Poisson's ratio is 0.3.

14M

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Code: 7GC42

II B.Tech. II Semester Supplementary Examinations February 2022
Probability and 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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UNIT–I

1. a) If $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$ and $P(A \cup B) = \frac{1}{2}$ then evaluate $P(A/B)$, $P(B/A)$, $P(A \cap B')$ and $P(A/B')$ 8M

   b) State and prove Addition theorem on probability for three events.   6M

OR

2. a) State and prove Baye's theorem.   8M

   b) A card is drawn from a well shuffled deck of 52 playing cards. What is the probability of drawing a red king (ii) 3, 4, 5 or 6 (iii) black card.   6M

UNIT–II

3. a) Find the continuous probability function f(x)=k x² e⁻ˣ when x ≥ 0 find (i) k (ii) mean (iii) variance   7M

   b) A hospital switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that
   (i) There are at most 2 emergency calls in a 10 minute interval
   (ii) There are exactly 3 emergency calls in a 10 minute interval   7M

OR

4. a) If a random variable has a poisson distribution such that P (1) = P(2) find
   (i) Mean of the distribution,(ii) P(4),(iii) P(x ≥ 1),(iv) P(1<x<4)   7M

   b) In a normal distribution, 7% are under 35 and 89% are under 63. Find the mean and the standard deviation of the distribution.   7M

UNIT–III

5. A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval   14M

OR

6. A population consists of the five numbers 2, 3, 6, 8, 11. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means.   14M

UNIT–IV

7. An ambulance services claims that it takes on the average less than 10min to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 min and the variance of 16 min. test the significance 0.05 level.   14M

OR

8. A die is thrown 9000 times and of these 3220 yielded a die is thrown 9000 times and of these 3220 yielded a or 4. i.e., this is consistence with the hypothesis is that die was unbiased.   14M

UNIT–V

9. The number of automobile accidents per week in a certain community are as follows 12, 8, 20, 2, 14, 10, 15, 6, 9, and 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period   14M

OR

10. 200 digits were choose at random from a set of tables. The frequencies of the digits are shown below

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

   Use the chi-square test to assess the correctness of the hypothesis that the digits were distributed in equal number in the tables from which these were chosen.   14M

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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)
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| | Marks | CO | Blooms Level |

UNIT–I

1. a) Discuss about Heat loss factor in actual cycles with the help of simple diagram. **8M**

   b) Draw the P-V and T-S diagrams for Dual cycle and list out the various processes in the Dual cycle. **6M**

OR

2. a) Explain briefly

   i) Losses due to gas exchange process. ii) Exhaust blow down loss. **8M**

   b) Write a short notes for the following terms used in diesel engine.

   i) Compression ratio ii) cut-off ratio **6M**

UNIT–II

3. a) Classify the various components of IC engine with the help of simple sketch. **10M**

   b) Write a short notes about wet sump lubrication system. **4M**

OR

4. a) With neat sketch explain the working of magneto-ignition system. **10M**

   b) List out the differences between battery ignition system and Magneto ignition system. **4M**

UNIT–III

5. a) Elucidate the various stages of combustion in CI Engine with the help of pressure-crank angle diagram. **8M**

   b) Explain the following related to SI engines.

   i) Pre-ignition, ii) Anti-knock additives. **6M**

OR

6. a) Discuss the effects of the following operating variables on detonation in SI engines.

   i) Compression ratio ii) Inlet temperature of mixture 6M

   b) Explain the phenomenon of knock in CI engines and compare it with SI engine knock 8M

UNIT–IV

7. a) Why morse test is not used for single cylinder engine? Describe the method of finding friction power using Morse test. 8M

   b) Explain the measurement of brake power by using Rope Brake Dynamometer. 6M

OR

8. a) Discuss about various engine performance parameters used in IC engines. 8M

   b) A 4-cylinder, 4-stroke cycle engine having cylinder diameter 100 mm and stroke 120 mm was tested at 1600 rpm and the following readings were obtained. Fuel consumption = 0.27 litres/minute, Specific gravity of fuel=0.74, B.P. = 31.4 kW, Mechanical efficiency = 80%, Calorific value of fuel = 44000 kJ/kg. Determine : (i) bsfc, (ii) imep, and (iii) Brake thermal efficiency. 6M

UNIT–V

9. a) List out the various applications of compressed air. 4M

   b) Explain the working of single stage reciprocating air compressor and derive the expression for the work done without clearance volume. 10M

OR

10. A single stage single acting reciprocating air compressor takes in 17 m^3/min at suction conditions of 100 KPa and 25^0C. The delivery pressure is 700 KPa. The clearance volume is 6% of swept volume. The compression and expansion follows the law $PV^{1.3}$ = C. The speed of the compressor is 600 rpm. Stroke to bore ratio is 1. Find the power required to drive the compressor and cylinder dimensions. 14M

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II B.Tech. II Semester Supplementary Examinations February 2022
Electrical and Electronics Engineering
(Mechanical Engineering)

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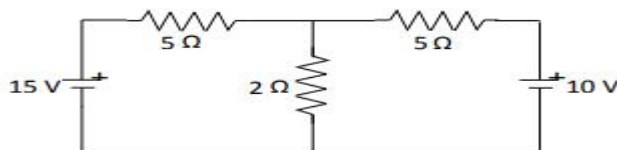Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)
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Marks

UNIT–I

1. a) State ohm's law and its limitations.   7M
   b) Define (i) Unilateral & Bilateral elements (ii) Active & Passive elements with examples.   7M

OR

2. a) Find the current through 2 resistance in the below circuit by using Kirchhoff's Laws.

   6M
   b) Define the following terms 1. Voltage 2. Current 3. Power 4. Energy   8M

UNIT–II

3. a) Write shorts notes on the types of dc Generators.   8M
   b) A separately excited dc generator running at 1500 rpm supplies 250 A at 125 V to a circuit of constant resistance. What will be the current when the speed is dropped to 1200 rpm with the field current unaltered? The armature resistance is 0.05 and the total drop at the brushes is 1.5 V. Ignore armature reaction   6M

OR

4. a) Explain the different types of dc motors with neat sketch.   4M
   b) Derive the torque equation of DC motor   10M

UNIT–III

5. a) Explain torque slip characteristics of a three phase induction motor   7M
   b) A 250 KVA, single phase transformer has 98.135% efficiency at full load and 0.8 lagging p.f. The efficiency at half load and 0.8 lagging p.f. is 97.751%. Calculate the iron loss and full load copper loss.   7M

OR

6. a) Define voltage regulation of transformer   4M
   b) Explain in detail about of Brake Test on 3- induction motor.   10M

UNIT–IV

7. a) Define ripple factor and Voltage regulation.   4M
   b) Explain the operation of full wave rectifiers with relevant waveforms   10M

OR

8. a) Explain how you will obtain the static characteristics of common emitter configuration   7M
   b) Explain the working of CE configuration of a BJT and draw its input, output characteristics. 7M

UNIT–V

9. a) What is induction heating   7M
   b) Enumerate the applications of induction heating.   7M

OR

10. Explain how Voltage, Frequency and Phase difference is measured using CRO with wave forms.   14M

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R-17

Code: **7GC41**

II B.Tech. II Semester Supplementary Examinations February 2021

Environmental Science

(Common to CE & ME)

Max. Marks: 70　　　　　　　　　　　　　　　　　　　　　　　　　　Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Define Environment. With the help of diagram relate the interactions between different components of environment. 　7M

   b) Enumerate multidisciplinary nature of environmental studies. 　7M

OR

2. a) Explain different methods to create environmental awareness in public. 　7M

   b) Describe the importance of environmental studies. 　7M

UNIT–II

3. a) Explain the common causes of deforestation around the world. 　7M

   b) Discuss the impact of drought and floods. Explain control measures with suitable case study. 　7M

OR

4. a) What are solar cells? Draw a diagram and enumerate its applications. 　7M

   b) Discuss the various types of land degradation with its causes and solutions. 　7M

UNIT–III

5. a) With the help of neat diagram explain energy flow and material flow in the environment. 　7M

   b) Draw neat diagram of Nitrogen cycle and explain the flow of different forms of nitrogen in environment. 　7M

OR

6. a) Identify major threats to biodiversity and explain In- Situ conservation techniques 　7M

   b) Compare different biodiversity hot spots. 　7M

UNIT–IV

7. a) List the major air pollutants and explain their effects on human beings. 　7M

   b) Write short notes on –
   i. Eutrophication.　　**ii**. Itai – itai.　　**iii**. Blue baby syndrome. 　7M

OR

8. a) Give an account of noise generated during Diwali – the festival of lights. What would you suggest to reduce this menace? 　7M

   b) Describe the human activities contributing to large scale thermal pollution. 　7M

UNIT–V

9. a) With neat sketch explain different rain water harvesting techniques. 　7M

   b) Enumerate causes, effects and control measures of acid rain. 　7M

OR

10. a) Write a note on Forest conservation act. 　7M

    b) Discuss the effect of population explosion on environment. 　7M

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