R-17

Code: 7G542

II B.Tech. II Semester Supplementary Examinations May / June 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 dynamic viscosity? How does viscosity of fluid and Gas vary with temperature | 6M

    b) An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of shaft is 0.5 m and it rotates at 200 rpm. Calculate the horsepower lost in the oil for a sleeve length of 100 mm. The thickness of the oil film is 1.0 mm. | 8M

OR

2. Derive the expression for meta-centre height of a floating body? | 14M

UNIT–II

3. a) Explain Hydraulic Gradient Line and Total Energy Line. | 4M

    b) A Venturimeter of 150mm X 75mm is installed in a horizontal pipeline carrying an oil of specific gravity 0.90. The difference of pressure head between the inlet and throat recorded by U tube differential manometer is 175mm of mercury. Determine the discharge through the pipe taking C_d the meter as 0.97. | 10M

OR

4. Derive an equation for discharge of a Venturimeter? Explain why C_d of a Venturimeter is more than that of orifice meter. | 14M

UNIT–III

5. a) What do you mean by impact of jet? Explain? Derive an expression for force exerted by the jet on a stationary vertical plate? | 6M

    b) A nozzle of 56 mm diameter delivers a stream of water at 30 m/sec perpendicular to a plate that moves away from the jet at 8 m/sec. Find the work done and efficiency of the jet | 8M

OR

6. Derive an expression for the force exerted by a jet striking the curved plate at one end tangentially when the plate is symmetrical. | 14M

UNIT–IV

7. a) What is meant by cavitations? What is Thomas's cavitations factor and what is its significance for turbines? | 6M

    b) Explain what you understand by governing of a hydraulic turbine with neat sketches. | 8M

OR

8. a) What is a surge tank and what are the uses of it in a hydropower turbine installation? | 6M

    b) A turbine develops 7355 Kw under a head of 24.7m at 210 rpm. What is its specific speed? If this turbine is tested in the laboratory where the head available is only 7.5m, what power will it develop and at what speed? | 8M

UNIT–V

9. a) What is a reciprocating pump? Describe the principle and working of a reciprocating pump with a neat sketch? | 8M

    b) Define indicator diagram? How will you prove that area of indicator diagram is proportional to the work done by the reciprocating pump? | 6M

OR

10. A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1200 r.p.m. works against a total head of 75m. The velocity of flow through the impeller is constant and equal to 3m/s. The vanes are set back at an angle of 30o at outlet. If the outer diameter of the impeller is 600mm and width at outlet is 50mm, determine: (a) vane angle at inlet, (b) workdone per second by impeller, (c) manometric efficiency. | 14M

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II B.Tech. II Semester Supplementary Examinations May/June 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

UNIT–I

1. a) What is redundant degrees of freedom of a mechanism   7M

   b) In what way a mechanism differ from a machine?   7M

OR

2. Sketch and explain the various inversions of a slider crank chain.   14M

UNIT–II

3. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine : a. Linear velocity and acceleration of the midpoint of the connecting rod, and b. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.   14M

OR

4. The crank and connecting rod of a theoretical steam engine are 0.5 m and 2m long respectively. The crank makes 180 r.p.m. in the clockwise direction. When it has turned 45° from the inner dead centre position, determine :

   1. velocity of piston, 2. angular velocity of connecting rod, 3. velocity of point E on the connecting rod 1.5 m from the gudgeon pin, 4. velocities of rubbing at the pins of the crank shaft, crank and crosshead when the diameters of their pins are 50 mm, 60 mm and 30 mm respectively, 5. position and linear velocity of any point G on the connecting rod which has the least velocity relative to crank shaft.
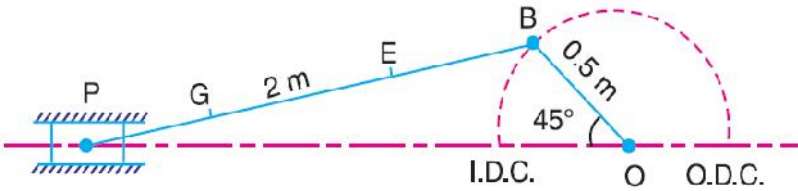
                                                                                              14M

UNIT–III

5. Two shafts are connected by a universal joint. The driving shaft rotates at a uniform speed of 1200 r.p.m. Determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 100 r.p.m. Also calculate the maximum and minimum speeds of the driven shaft.   14M

OR

6. a) Derive the condition for correct steering.   7M

   b) Determine the greatest permissible angle between the axes of the two shafts which are connected by a Hooke's joint if the maximum variation in the speed of the driven shaft is 8 % of the mean speed. The driving shaft is rotating at a uniform speed of 500 r.p.m. Also find the maximum and the minimum speeds of the driven shaft.   7M

UNIT–IV

7. Derive an expression for the minimum number of teeth required on the wheel in order to avoid interference in involute gear teeth. 14M

OR

8. The arm of an epicyclic gear train rotates at 100 r.p.m in the anti-clockwise direction. The arm carries two wheels A and B having 36 and 45 teeth respectively. The wheel A is fixed and the arm rotates about the centre of wheel A. Find the speed of wheel B. What will be the speed of B, if the wheel A instead of being fixed, makes 200 r.p.m. clockwise? 14M

UNIT–V

9. A cam is to give the following motion to a knife-edged follower :
1. Outstroke during 60° of cam rotation ;
2. Dwell for the next 30° of cam rotation ;
3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation.
The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the 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 20 mm from the axis of the cam shaft. 14M

OR

10. 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

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II B.Tech. II Semester Supplementary Examinations May/June 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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Marks

UNIT–I

1. a) Given P(A)=1/4, P(B)=1/3 and P P(AUB) =1/2 , then evaluate (i) P(A/B),(ii) P(B/A) , (iii) P(A∩B^c), (iv) P(A^c/B^c)   8M

    b) A card is drawn from a pack of 52 playing cards. What is the probability of drawing black card.   6M

OR

2. a) A class consists of 6 girls and 10 boys. If a committee of 3 is chosen at random from the class, find the probability that (i) 3 boys are selected, (ii) exactly 2 girls are selected.   8M

    b) Two dice are thrown and their sum is 7. Find the probability that at least one of the dice shows up 2   6M

UNIT–II

3. a) A die is thrown 6 times. If getting an even number is a success, find the probabilities of (i) at least one success (ii)   3 successes (iii) 4 successes   7M

    b) A continuous random variable x has a probability density function

    $$f(x) = \begin{cases} \dfrac{(x+1)}{2}, & -1 \le x \le 1 \\ 0 & \text{else where} \end{cases}$$

    represents the density of a random variable x, then find $P(X \le 0)$, mean and variance.   7M

OR

4.   For the normal distribution with mean 2 and standard deviation 4, evaluate

    (i) $P(-6 < x < 3)$, (ii) $P(x \ge 5)$ and (iii) $P(-4 < x < 4)$ 14M

UNIT–III

5. a) The variance of population is 2. The size of the sample collected from the population is 169. What is the standard error of mean   7M

    b) A population consists of 5, 10, 14, 18, 13, 24. Consider all possible samples of size 2 which can be drawn without replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means.   7M

OR

6. a) A random sample of 100 teachers in a large metropolitan area revealed a mean weekly salary of Rs.487 with a standard deviation rs 48. With what degree of confidence can assert that the average weekly salary of all teachers in the metropolitan area is between 472 to 502?   7M

    b) What is the size of the smallest sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 95% confidence.   7M

UNIT–IV

7. In a random sample of 60 works, the average time taken by them to get work is 33.8min with a S.D of 6.1 min can we reject the null hypothesis $\sim\,=15150$ min in the favour of alternative hypothesis $\sim\,>15150$ at 0.05 level of significance.   14M

OR

8. A manufacturer of electronic equipment subjects sample of two completing brands of transistors to an accelerated performance test. If 45 of 180transistors of the first kind and 34 of 120 transistors of the second kind fail the test. What he conclude at the level of significance $\Gamma=0.05$ about the difference between the corresponding sample proportions.   14M

UNIT–V

9. The following data give the number of air-craft accidents that occurred during the various days of a week

Day	Mon	Tue	Wed	Thu	Fri	sat
No.of accidents	15	29	13	12	16	15

Test whether the accidents are uniformly distributed over the week.   14M

OR

10. Two random sample drawn from two normal populations have the variable values as below

Sample1	19	17	16	28	22	23	19	24	26			
Sample2	28	32	40	37	30	35	40	28	41	45	30	36

Obtain the estimate of the variance of the population and f test whether the two population have the same variance.   14M

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Code: 7G541

II B.Tech. II Semester Supplementary Examinations May/June 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

	UNIT–I	

1. a) Compare OTTO, DIESEL, and Dual cycle considering
   i) Same compression ratio and same heat rejection
   ii) Same maximum pressure and temperature and same heat rejection.   10M

   b) Draw P-V and T-S diagrams of Diesel cycle.   4M

OR

2. Explain the various losses involved in actual cycles with the help of suitable sketch wherever applicable.   14M

UNIT–II

3. a) Discuss about i) Solid Injection System. ii) Thermosyphon cooling system.   7M

   b) Explain the following systems. i) Air Injection System, ii) Mist Lubrication System   7M

OR

4. Why is ignition required in an I.C. engine? Explain the construction and working of a battery system with a neat sketch. List out its advantages.   14M

UNIT–III

5. a) State the various phases of combustion in SI engine with help of pressure-crank angle diagram and explain them.   8M

   b) Discuss about Normal combustion and Abnormal combustion.   6M

OR

6. a) What are the basic parameters that influence the flame speed? Discuss the influence of engine variables of the flame speed.   8M

   b) What do you understand by octane number? What is its significance in SI engine combustion?   6M

UNIT–IV

7. a) A single cylinder 4-stroke cycle engine is fitted with a rope brake. The dia of the brake wheel is 800mm and rope dia is 30mm. the dead load on the brake is 300N and the spring balance reads 30N. If the engine runs at 600rpm what will be the brake power of the engine?   6M

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

OR

8. a) Six cylinder, four stroke petrol engine having a bore of 90mm and stroke of 100mm has a compression ratio of 7. The relative efficiency with reference to indicated thermal efficiency is 55% when the indicated specific fuel consumption is 0.3 kg/kWh. Estimate the calorific value of fuel and fuel consumption (in kg/h), given that the imep is 8.5bar and speed is 2500rpm.   8M

   b) Explain the air box method for the measurement of air consumption in internal combustion engines.   6M

UNIT–V

9. a) Compare Rotary and Reciprocating Air Compressors.   7M

   b) List out the differences between axial flow compressors and centrifugal compressors.   7M

OR

10. a) Classify Rotary compressors.   4M

    b) Explain the construction and working principle of centrifugal compressor with neat sketch. Draw its velocity triangles and Show its velocity and pressure variation.   10M

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II B.Tech. II Semester Supplementary Examinations May / June 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) Define the following terms 1. Voltage 2. Current 3. Power 4. Energy   8M
   b) State ohm's law and its limitations.   6M

OR

2. Four resistors of 2 ohm, 3 ohm, 4 ohm & 5 ohm respectively, are connected in parallel.
    What potential difference must be applied to the group in order that total power of 100 W
    may be absorbed?   14M

UNIT–II

3. a) With neat diagrams explain the working principle of DC Motor   8M
   b) What is back EMF?   6M

OR

4. a) Explain about losses of a DC Generator.   8M
   b) Draw and explain various characteristics of DC generators   6M

UNIT–III

5. a) Describe the construction details of single phase transformer   7M
   b) Explain working principle of operation of single phase Transformer   7M

OR

6. Explain Open circuit and Short circuit tests on a single phase transformer with circuit
    diagrams.   14M

UNIT–IV

7. a) Explain construction of Bipolar Junction Transistor with figures.   10M
   b) Draw the characteristics of BJT   4M

OR

8. a) Explain how a Transistor work as an amplifier.   7M
   b) Explain about frequency response of a CE amplifier.   7M

UNIT–V

9. Explain the principle of dielectric heating with relevant diagram   14M

OR

10. a) What are the functions of Electron gun and accelerating anode in the CRT   8M
    b) Explain the various applications of CRO   6M

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R-17

Code: 7GC41

II B.Tech. II Semester Supplementary Examinations May/June 2022
Environmental Science
(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)
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Marks

UNIT–I

1. a) What is the scope of environmental studies?   7M
   b) Summarize the need for public awareness about environment.   7M

OR

2. a) Define environment. Explain the segments of an environment.   7M
   b) Explain the multidisciplinary nature of environmental studies.   7M

UNIT–II

3. a) Describe the commercial and ecological uses of forest resources.   7M
   b) What are renewable and non-renewable energy resources?   7M

OR

4. a) Define drought. Outline the effects of drought.   7M
   b) Describe the soil conservation methods.   7M

UNIT–III

5. a) Explain the food chain with examples.   7M
   b) Discuss the salient features of forest ecosystem.   7M

OR

6. a) Discuss the values of biodiversity.   7M
   b) What are the various threats leading to loss of biodiversity?   7M

UNIT–IV

7. a) Outline the different causes of water pollution and suggest few measures to control it.   7M
   b) Explain about the causes of soil pollution.   7M

OR

8. a) Identify the human activities contributing to large scale air pollution.   7M
   b) What are the effects of noise pollution?   7M

UNIT–V

9. a) List out various causes for population explosion? Mention few measures to control
      population explosion.   7M
   b) Discuss the advantages of rain water harvesting.   7M

OR

10. a) Examine the importance of value based environmental education in protection of
       environment.   7M
    b) Discuss briefly the environment and its relation to human health.   7M

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