

Hall Ticket Number :										
----------------------	--	--	--	--	--	--	--	--	--	--

R-17

Code: 7GC41

II B.Tech. II Semester Supplementary Examinations April 2023

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)

	Marks	CO	BL
UNIT-I			
1. a) Explain the need for studying environmental problems.	7M	CO1	L2
b) Categorize the methods to create environmental awareness among people.	7M	CO1	L4
OR			
2. a) Define environment. Discuss briefly the importance of environment.	7M	CO1	L1
b) List out different branches of science having close relationship with environmental studies.	7M	CO1	L1
UNIT-II			
3. Describe the advantages and problems associated with dams.	14M	CO2	L2
OR			
4. a) Explain the effects of floods.	7M	CO2	L2
b) Discuss the uses of forest.	7M	CO2	L2
UNIT-III			
5. Describe the various methods of conservation of biodiversity.	14M	CO3	L1
OR			
6. a) Explain with the help of a diagram the nitrogen cycle.	7M	CO3	L2
b) Categorize the types of ecological pyramids.	7M	CO3	L4
UNIT-IV			
7. Discuss the effects of noise pollution and its control.	14M	CO4	L2
OR			
8. a) Describe the sources of water pollution.	7M	CO4	L1
b) Summarize the effects of radiation pollution.	7M	CO4	L2
UNIT-V			
9. Explain the impact of acid rain and how can we control it.	14M	CO5	L2
OR			
10. Describe the environmental consequences of unethical behavior of human population.	14M	CO5	L1

Hall Ticket Number :

R-17

Code: 7G542

II B.Tech. II Semester Supplementary Examinations April 2023

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 BL

UNIT-I

1. A U-tube differential manometer has been arranged to measure the pressure difference between two points A and B in a sloping pipeline conveying water. The point B lies 20 cm higher than point A. If the difference in the level of mercury in limbs of U-tube is 60 cm, calculate the pressure difference ($P_A \sim P_B$). 14M CO1 L2

OR

2. Derive the equation of continuity for one dimensional flow of an incompressible fluid 14M CO1 L2

UNIT-II

3. Water flows through a horizontal conical pipe, with diameter at the larger end as 1.3 m and that at the smaller end as 0.70 m. the pressure head at the smaller head is 5 m of water, and the discharge is 3.5 m³ /sec. Calculate the velocities at the two ends and the pressure head at the larger end. Neglect losses. 14M CO2 L3

OR

4. State the momentum equation. How will you apply momentum equation for determining the force exerted by a flowing fluid on a pipe bend? 14M CO2 L2

UNIT-III

5. What do you understand by pumped storage type of power station? What are its merits and demerits when compared with other types? Use sketches if necessary. 14M CO3 L2

OR

6. A jet of water of diameter 50mm, having a velocity of 20 m/s strikes a curved vane which is moving with a velocity of 10 m/s in the direction of jet. The jet leaves the vane at an angle of 60° to the direction of motion of vane at outlet. Determine i) Force exerted by the jet on the vane in the direction of motion ii) Work done per second by the jet. 14M CO3 L3

UNIT-IV

7. Define a turbine and bring out the differences between reaction turbine and impulse turbine. 14M CO4 L2

OR

8. Explain what you understand by governing of a hydraulic turbine with neat sketches. 14M CO4 L2

UNIT-V

9. Define and explain how manometric head of a centrifugal pump is measured. Compare this with total head, suction head and delivery head of a centrifugal pump. 14M CO5 L2

OR

10. The impeller of a centrifugal pump has 1.2 m outside diameter. It is used to lift 1800 litres of water per second against a head of 6 m. Its vanes make an angle of 150° with the direction of motion at outlet and runs at 200 rpm. If the radial velocity of flow at outlet is 2.5 m/s, find the manometric efficiency. Also find the lowest speed to start the pump, if the diameter of the impeller at inlet is equal to half the diameter at exit. 14M CO5 L3

Code: 7G543

II B.Tech. II Semester Supplementary Examinations April 2023

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)

Marks

UNIT-I

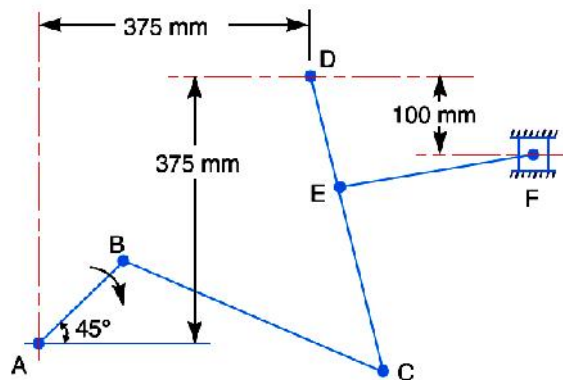
1. a) Define and explain the following terms: mechanism, machine, link and kinematic pair. 4M
- b) What do you understand by degrees of freedom? For a plane mechanism derive an expression for degrees of freedom 10M

OR

2. a) What is redundant degrees of freedom of a mechanism 7M
- b) In what way a mechanism differ from a machine? 7M

UNIT-II

3. The mechanism, as shown in Fig, has the dimensions of various links as follows : $AB = DE = 150$ mm ; $BC = CD = 450$ mm ; $EF = 375$ mm. The crank AB makes an angle of 45° with the horizontal and rotates about A in the clockwise direction at a uniform speed of 120 r.p.m. The lever DC oscillates about the fixed point D , which is connected to AB by the coupler BC . The block F moves in the horizontal guides, being driven by the link EF . Determine: 1. velocity of the block F , 2. angular velocity of DC , and 3. rubbing speed at the pin C which is 50 mm in diameter.



14M

OR

4. 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: 1. Linear velocity and acceleration of the midpoint of the connecting rod, and 2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position. 14M

UNIT-III

5. Two shafts are connected by a Hook's joint. The power supplied to the driving shaft is 7.5 kW and the driving shaft rotates at uniform speed of 200 rpm. The angle between the axis of two shafts is 18° . If the output torque on the driven shaft is not to vary by more than 20% of the input torque, what is the necessary radius of gyration of the fly wheel of 40 Kg mass mounted on the driven shaft. 14M

OR

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

UNIT-IV

7. The following data relate to a pair of 20° involute gears in mesh: Module=6mm, Number of teeth on pinion = 17, Number of teeth on gear = 49 ; Addenda on pinion and gear wheel = 1 module.
Find : a. The number of pairs of teeth in contact ; b. The angle turned through by the pinion and the gear wheel when one pair of teeth is in contact, and c. The ratio of sliding to rolling motion when the tip of a tooth on the larger wheel (i) is just making contact, (ii) is just leaving contact with its mating tooth, and (iii) is at the pitch point. 14M

OR

8. 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 20° , module 8 mm and addendum equal to one module. 14M

UNIT-V

9. Draw the profile of a cam operating a knife-edge follower when the axis of the follower passes through the axis of cam shaft from the following data:
(a) Follower to move outwards through 30 mm during 60° of cam rotation,
(b) Follower to dwell for the next 45°
(c) Follower to return to its original position during next 90° ,
(d) Follower to dwell for the rest of cam rotation.
The displacement of the follower is to take place with S.H.M during both the outward and return strokes. The least radius of the cam is 30 mm. If the cam rotates at 300 r.p.m., determine the maximum velocity and acceleration of the follower during outward stroke and return stroke. 14M

OR

10. 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

Hall Ticket Number :

R-17

Code: 7GC42

II B.Tech. II Semester Supplementary Examinations April 2023

Probability and Statistics

(Common to CE , ME and CSE)

Max. Marks: 70

Time: 3 Hours

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

Marks

UNIT-I

1. a) A card is drawn from a pack of 52 cards. Find the probability of getting a king or a heart or a red card. 6M
- b) A University bought 45% , 25% and 30% of computers from HCL, WIPRO and IBM respectively and 2%, 3% and 1% of these were found to be defective. Find the probability of a computer selected at random is found to be defective? 8M

OR

2. a) Define the following (i) Sample Space (ii) event (iii) Outcome (iv) Probability 8M
- b) If two dice are throw , Find the probability of getting a sum is10 6M

UNIT-II

3. a) The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a standard deviation of Rs.5. Estimate the number of workers whose weekly wages will be (i) Between Rs.69 and Rs.72 (ii) Less than Rs.69 (iii)More than Rs.72. 7M
- b) Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys? Assume equal probabilities for boys and girls. 7M

OR

4. a) A random variable x has the following probability function values of x.

x	-2	-1	0	1	2	3
P(x)	0.1	K	0.2	2k	0.3	k

Find the values K, $P(X \geq -1)$, $P(X \leq 2)$ 7M

- b) Fit a poisson distribution to the frequency distribution

x	0	1	2	3	4
f	46	38	22	9	1

7M

UNIT-III

5. a) 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
- b) 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. 7M

OR

6. a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. Construct 98% confidence interval. 7M
- b) A random sample size 100 is taken from a population with $\sigma = 5.1$. Given that the sample mean $\bar{x} = 21.6$. Construct a 95%confidence interval for population mean. 7M

Important Note: 1. On completing your answers. Compulsorily draw diagonal cross line on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8=50, will be treated as malpractice.

UNIT-IV

7. To examine the hypothesis that the husbands are more intelligent than the wives an investigator took a sample of 10 couples and administered them a test which measures the I.Q. The results are as follows

Husbands	117	105	97	105	123	109	86	78	103	107
Wives	106	98	87	104	116	95	90	69	108	85

Test the hypothesis with a reasonable test at the level of significance of 0.05. 14M

OR

8. a) In a sample of 1000 people in Karnataka, 540 are rice eaters and the rest are wheat eaters can we assume that both rice and wheat are equally popular in this state at 1% of level of significance. 7M
- b) Tests performed with a random sample of 40 engineers produced by a large manufacture. Show that they have a mean thermal effect of 31.45% with a standard deviation 1.6% at 0.01 level of significance. Test the null hypothesis $\mu = 32.3\%$, against the alternative hypothesis $\mu \neq 32.3\%$. 7M

UNIT-V

9. a) The time taken by workers in performing a job by method I and method II is given below

Method I	20	16	26	27	23	22	-
Method II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly? 7M

- b) The following table gives the classification of 100 workers according to sex and nature of work. Test whether the nature of work is independent of the sex of the worker.

	Stable	Unstable	Total
Males	40	20	60
Females	10	30	40
Total	50	50	100

7M

OR

10. 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

Hall Ticket Number :

--	--	--	--	--	--	--	--	--	--

R-17

Code: 7G541

II B.Tech. II Semester Supplementary Examinations April 2023

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 BL

UNIT-I

1. An air standard Otto cycle has a compression ratio of 8. At the start of the compression process, the temperature is 27^o C and the pressure is 1 bar. If the maximum temperature of the cycle is 1080^o C. Calculate i) The heat supplied per kg of air, ii) The network done per kg of air, iii) The thermal efficiency of the cycle. 14M CO1 L3

OR

2. a) List any three principle factors that influence engine performances? And explain them. 7M CO1 L1
b) What are Air standard cycles? What are the assumptions for Air standard cycles? 7M CO1 L1

UNIT-II

3. a) Draw the neat sketch of fuel pump for C.I Engine? 7M CO2 L2
b) How the internal combustion engines are classified? 7M CO2 L1

OR

4. a) Sketch and explain Mist type lubrication system. 7M CO2 L2
b) Describe about air injection system. 7M CO2 L2

UNIT-III

5. What causes the knock in a C.I engine? In which part of the combustion processes (beginning or the end) does it occur? 14M CO3 L1

OR

6. a) Define pre ignition? Explain with diagram. 7M CO3 L1
b) Discuss the need for air movement in CI engines. 7M CO3 L2

UNIT-IV

7. A single cylinder 4-stroke cycle engine is fitted with a rope brake. The dia of the brake wheel is 600mm and rope dia is 26mm. the dead load on the brake is 200N and the spring balance reads 30N. If the engine runs at 450rpm what will be the brake power of the engine? 14M CO4 L3

OR

8. a) Explain the measurement of brake power by using Rope Brake Dynamometer. 7M CO4 L2
b) How do you determine frictional losses and indicated horse power? 7M CO4 L2

UNIT-V

9. An air compressor has a piston displacement of 2200 cm³ with a clearance of 5%. It receives air at 110 kPa. There is a pressure drop of 3.5 kPa through the suction valves. The discharge valves also leaks and a drop of 5% occurs in delivery pressure. Using $n = 1.35$, calculate and plot the volumetric efficiency for the discharge pressure of 350, 700, 1000, 1500, 2000 and 2500 kPa. 14M CO5 L3

OR

10. a) List out the advantages and disadvantages of use of centrifugal air compressor. 7M CO5 L1
b) Derive the condition for minimum work required in reciprocating compressor? 7M CO5 L6
