Hall Ticket Number :										

R-14

Code: 4G541

II B.Tech. II Semester Supplementary Examinations October 2020

Applied Thermodynamics-I

(Mechanical Engineering)

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) Why the actual cycle efficiency is much lowers the air standard cycle efficiency? List the major losses and differences in actual engine and air standard cycles. 7M

   b) Explain

   i) Time loss factor ii) Heat loss factor iii) Loss due to gas exchange process 7M

OR

2. a) Compare and contrast the differences between Two Stroke engines with Four stroke engines? 7M

   b) Explain Magneto ignition system with diagram. 7M

UNIT–II

3. a) Describe with suitable sketches the combustion phenomenon in C.I engines and explain the two phases of combustion. 8M

   b) What is the effect of

   i) Viscosity **ii**) Specific heat iii) Density and iv) Gum deposits on the quality of a fuel. 6M

OR

4. a) Explain and discuss the phenomenon of diesel knock in C.I engines 6M

   b) What are the different stages of combustion in C.I engine? Explain with P-Θ diagram. 8M

UNIT–III

5. a) Explain any one type of brake dynamometer in measuring the power output of an engine. 7M

   b) Describe the various engine performance parameters in brief. 7M

OR

6. a) What is the use of heat balance sheet of an engine? Mention the various items to be determined to complete the heat balance sheet. 10M

   b) A rope brake has brake wheel diameter of 600 mm and the diameter of rope is 5 mm. The dead load on the brake is 210 N and spring balance reads 30 N. If the engine makes 450rpm, find the brake power developed. 4M

UNIT–IV

7. a) List the various types of rotary compressors and explain the working principle of Roots blower. 6M

   b) An air compressor takes in air at 1 bar and 20^0C and compresses it according to law $pv^{1.2}$=constant. It is then delivered to a receiver at a constant pressure of 8 bar. R= 0.287 kJ/kg K. Determine: (i) Temperature at the end of compression; (ii) Work done and heat transferred during compression per kg of air. 8M

OR

8. A single stage, double acting compressor has a free air delivery of 14 m^3 /min. measured at 1.013 bar and 15^0 C. The pressure and temperature in the cylinder during induction are 0.95 bar, 32^0 C. The delivery pressure is 7 bar and index of compression and expansion, n = 1.3. The clearance volume is 5% of the swept volume. Calculate:

   (i) Indicated power required. (ii) Volumetric efficiency. 14M

UNIT–V

9. a) Draw the schematic diagram of axial flow air compressor and explain its working along with velocity triangles. 6M

   b) What is surging in axial- flow compressors? What are its effects? Describe briefly. 8M

OR

10. a) Compare axial flow compressor and centrifugal compressor. 6M

    b) A centrifugal air compressor having a pressure compression ratio of 5 compresses air at the rate of 10 kg/s. If the initial pressure and temperature of the air is 1 bar and 20^0C, find (i) The final temperature of the gas and (ii) Power required to drive the compressor. Take ɣ=1.4 and Cp=1 kJ/kg K. 8M

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Hall Ticket Number :										

R-14

Code: 4G543

II B.Tech. II Semester Supplementary Examinations October 2020

Fluid Mechanics and Hydraulic Machinery

(Mechanical Engineering)

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 mass density, specific weight, specific volume and specific gravity. 7M

   b) The dynamic viscosity of oil used for lubrication between a shaft and sleeve is 6 poise. The shaft is of diameter 0.4*m* and rotates at 190 r.p.m. Calculate the power lost in the bearing for a sleeve length of 90*mm*. The thickness of the oil film is 1.5*mm*. 7M

OR

2. a) Explain the terms stream line, stream tube ,streak line and path line 7M

   b) Derive Continuity equation? 7M

UNIT–II

3. From the fundamentals derive Euler's energy equation and from it deduce the Bernoulli's equation. 14M

OR

4. a) Define body force and surface force 4M

   b) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000m and 1m respectively, while the length and diameter of second parallel pipe are 2000m and 0.8m. Find the rate of flow in each parallel pipe, if total flow in the main is $3m^3/s$. The co-efficient of friction for each parallel pipe is same and equals to 0.005. 10M

UNIT–III

5. a) Draw the general layout and explain the elements of hydroelectric power plant. 7M

   b) Explain about pumped storage power plant? 7M

OR

6. A jet of water of 86 mm diameter strikes a curved vane at the centre with a velocity of 30m/sec. The curved vane is moving with a velocity of 8m/sec in the direction of the jet. Find the force exerted on the plate in the direction of the jet, power and efficiency of the jet. Assume that the plate is smooth. 14M

UNIT–IV

7. How are Hydraulic turbines classified and explain? 14M

OR

8. a) State the advantages and disadvantages of Francis turbines over a Pelton wheel. 7M

   b) How are Hydraulic turbines classified and explain? 7M

UNIT–V

9. a) What is governing and how it is accomplished for different types of water turbines? 7M

   b) What is cavitation? How can it be avoided in reaction turbines? 7M

OR

10. Define specific speed of a centrifugal pump. Derive an expression for the specific speed 14M

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Hall Ticket Number :										

R-14

Code: 4GC42

II B.Tech. II Semester Supplementary Examinations October 2020

Probability & Statistics

(Common to CE, ME, CSE & IT)

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) Find the probability of getting a sum of 10 if we throw two dice

   b) A random variable X has the following probability function

x	0	1	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$7K^2+K$

   (i) Find the value of K
   (ii) Evaluate p(0<X<5)
   (iii) Evaluate p(X<6)

OR

2. a) If P(A) = $\frac{1}{2}$, P(B) = $\frac{1}{3}$ and P(A∩B) = $\frac{1}{5}$ then find (i) P(AUB) (ii) $P(A^c \cap B)$ (iii) $P(A \cap B^c)$ (iv) $P(A^c \cap B^c)$

   b) Find the continuous probability function $f(x)=k\,x^2\,e^{-x}$ when x≥ 0 find (i) k (ii) mean (iii) variance

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

   b) 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)

OR

4. a) The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find P(x ≥ 1) and P(x > 2)

   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

UNIT–III

5. a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative

   b) A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval

OR

6. 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

   b) A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car and he wants to be able to assert with 95%. Confidence that the mean of his sample is of by at most 0.5 minutes. If he can presume from past experience that σ = 1.6 minutes how large a sample will have to take

UNIT–IV

7. a) In a sample of 1,000 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 the state at 1% level of significance

   b) If 80 patients are treated with an antibiotic 59 got cured. Find a 99% confidence limits to the true population of cure

OR

8. The mean yield of wheat from a district A was 210 pounds with S.D 2.5 inches per acer from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a sample of 150 plots. Assuming that the S.D of yield in the entire state was 11 pounds. Test whether there is any significant difference between the mean yield of crops in the two districts

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

OR

10. 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

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