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R-17

Code: 7GC42

II B.Tech. II Semester Supplementary Examinations May / June 2024

Probability and Statistics

(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)

UNIT-I

- 1. a) State and prove Addition theorem on probability for two events. 8M
- b) If two dice are throw , Find the probability of getting a sum is10 6M

OR

- 2. a) A card is drawn from a pack of 52 playing cards. What is the probability of drawing black card? 6M
- b) State and prove Baye's theorem. 8M

UNIT-II

- 3. a) The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find $P(x = 1)$ and $P(x > 2)$ 7M
- b) Find the continuous probability function $f(x)=k x^2 e^{-x}$ when $x \geq 0$ find (i) k (ii) mean 7M

OR

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

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. The mean and standard deviation of marks scored by a sample of 100 students are 67.45 and 2.92. Find (i) 95% and (ii) 99% confidence intervals for estimating the mean marks of the student population. 14M

UNIT-IV

- 7. A sample of 900($n = 900$) members has a mean 3.4cm ($\bar{x} = 3.4$)and standard deviation 2.61cm ($s = 2.61$) is the sample has been taken from a large population of mean 3.25cm ($\mu = 3.25$)and standard deviation 2.61cm. if the population is normal and its mean is unknown . 14M

OR

8. A manufacturer of electronic equipment subjects sample of two completing brands of transistors to an accelerated performance test. If 45 of 180 transistors of the first kind and 34 of 120 transistors of the second kind fail the test. What he conclude at the level of significance $\alpha = 0.05$ about the difference between the corresponding sample proportions. 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. In an investigation on the machine performance, the following results are obtained

	No. of units inspected	No. of defectives
Machine I	375	17
Machine II	450	22

Test whether there is any significant performance of two machines at $\alpha = 0.05$ 14M

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R-17

Code: 7G541

II B.Tech. II Semester Supplementary Examinations May/June 2024

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. A Diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of the stroke. Find the air standard efficiency of the engine. (Take $\gamma = 1.4$)
- 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. Illustrate the working principle of a battery ignition system with a neat sketch. 14M CO2 L4

OR

4. a) Explain Thermosyphon cooling system with a neat diagram. 7M CO2 L2
- b) Sketch and explain the port timing diagram for 2 stroke SI engine. 7M CO2 L2

UNIT-III

5. Elaborate the differences between normal and abnormal combustion? Explain it with one or two parameters. 14M CO3 L2

OR

6. a) What are different ill effects of knocking? 7M CO3 L1
- b) Suggest the methods to minimize knocking in SI engines? 7M CO3 L2

UNIT-IV

7. A petrol engine uses 0.27 Kg of fuel per B.P hour. C.V of the fuel is 44,000kJ/kg and Mech. Efficiency is 80% and compression ratio is 5.6, calculate a) brake thermal efficiency b) Indicated thermal efficiency c) Ideal air std Efficiency d) Relative efficiency based on B.P and I.P basis. 14M CO4 L3

OR

8. Explain the various engine performance parameters in detail. 14M CO4 L2

UNIT-V

9. 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

OR

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

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R-17

Code: 7G542

II B.Tech. II Semester Supplementary Examinations May/June 2024

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. The water is flowing through a tapering pipe having diameters 300mm and 150mm at sections 1 and 2 respectively. The discharge through the pipe is 40liters/sec. The section 1 is 10m above datum and section 2 is 6m above datum. Find the intensity of pressure at section 2 if that at section 1 is 400kn/m².

14M CO1 L3

OR

2. a) What are the important fluid properties? Write their units?
b) Distinguish between simple manometer and a differential manometer.

7M CO1 L1

7M CO1 L2

UNIT-II

3. An orifice meter with orifice diameter 15cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the coefficient of discharge of the meter is 0.64.

14M CO2 L3

OR

4. Derive the Euler's equation of motion along a streamline

14M CO2 L2

UNIT-III

5. A jet of water of diameter 60mm moving with a velocity of 40m/s strikes a curved fixed plate tangentially at one end at an angle of 30° to horizontal. The jet leaves the plate at an angle of 20° to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical directions.

14M CO3 L3

OR

6. What is a runoff river plant? What are the different parts and arrangements of such plants? Draw a neat sketch and explain.

14M CO3 L2

UNIT-IV

7. An axial flow turbine operates under a head of 21.8m and develops 21MW when running at 140 RPM. The external runner diameter is 4.5m and the hub diameter is 2m. If the hydraulic efficiency is 94% and the overall efficiency is 88%, determine the inlet and outlet blade angles.

14M CO4 L3

OR

8. With a neat sketch explain the working principle of Pelton wheel.

14M CO4 L2

UNIT-V

9. The internal and external diameters of the impeller of a centrifugal pump are 30 cm and 60 cm respectively. The pump is running at 1000 r.p.m. The vane angles at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water.

14M CO5 L3

OR

10. Define a centrifugal pump. Explain the working of a single-stage centrifugal pump with sketches

14M CO5 L2

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. 32+8=40, will be treated as malpractice.