

Time: 3 Hours**Max Marks: 60**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I1. a) Show that $f(z) = \sin z$ is analytic everywhere 6Mb) Show that $e^{-x}(x \sin y - y \cos y)$ is harmonic 6M**(OR)**2. Prove that the function $f(z) = \begin{cases} \frac{x^3(1+i) - y^3(1-i)}{(x^2+y^2)} & z \neq 0 \\ 0 & z = 0 \end{cases}$ 12M

is not analytic at origin, although C-R equations are satisfied at origin.

UNIT-II3. a) Evaluate $\oint_c \frac{\sin^2 z}{\left(z - \frac{\pi}{6}\right)^3} dz$ where c is the circle $|z| = 1.5$ by Cauchy's 6M

integral formula

b) Find the poles of the function $f(z) = \frac{z^2}{(z-1)^2(z+2)}$ and the 6M
residues at these poles**(OR)**4. Using Residue theorem, Calculate $\oint_C \frac{(4-3z)dz}{z(z-1)(z-2)}$ where C is the 12M
circle given by $|z| = 1.5$ **UNIT-III**5. a) The mean height of 200 students in a class is 163 cm. and the 6M
standard deviation is 20 cm. assuming that heights are
normally distributed. Find how many students whose heights
lie between 155 and 175 cms.b) If the population is 3,6,9,15,27. List all possible samples of 6M
size 3 that can be drawn without replacement from the given
population and hence find mean and variance of sampling
distribution of means**(OR)**

6. In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution. 12M

UNIT-IV

7. a) Explain Null hypothesis and Alternative hypothesis 4M
 b) A sample of 64 students has a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25kgs. Test at level of significance 0.05 8M

(OR)

8. On the basis of information given below about the treatment of 200 patients suffering from a disease. State whether the new treatment is comparatively superior to the conventional treatment by using χ^2 - test 12M

	Favorable	Not Favorable
New	60	30
Conventional	40	70

UNIT-V

9. a) By the method of least squares, fit a straight line $y = a + bx$ for the following data 6M

x	1	2	3	4	5
y	12	25	40	50	65

- b) Find the correlation coefficient between x and y from the following data 6M

x	78	89	97	69	59	79	68	57
y	125	137	156	112	107	138	123	108

(OR)

10. Fit parabola of the type $y = a + bx + cx^2$ to the following data 12M

X	1	5	7	9	12
Y	10	15	12	15	21

AR18

CODE: 18BST209

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Regular / Supplementary Examinations, March-2021

BIOLOGY

(Common to CE, CSE & IT)

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Describe fundamental differences between Science and Engineering with live examples. 6M
- b) What are the contemporary investigations of biology that leads as an independent discipline? 6M

(OR)

2. a) Discuss the major discoveries of biology in recent Two centuries. 6M
- b) Explain physical properties of Cytoplasm with reference to Thermodynamics. 6M

UNIT-II

3. a) Describe in detail the classification of organisms based on cellularity. 6M
- b) Describe chief components in media preparation for microbial culture. 6M

(OR)

4. a) Describe the ecological aspects of micro organisms. 6M
- b) Enumerate the flora and fauna in Terrestrial and Aquatic Ecosystems. 6M

UNIT-III

5. a) Explain Mendel Laws of Inheritance. 6M
- b) Discuss **any Two** single gene disorders in humans. 6M

(OR)

6. a) Describe about types and functions of RNA. 6M
- b) Explain the concept of Nucleosome. 6M

UNIT-IV

7. a) What are the criteria for the classification of Enzymes? 6M
- b) Describe the Mechanism of enzyme action with Two examples. 6M

(OR)

8. a) Explain briefly about the Hierarchy in protein structure. 6M
- b) Explain the concept of Transporters-Receptors of Proteins. 6M

UNIT-V

9. a) Explain the process of breakdown of the Glucose. 6M
- b) Explain the light reaction of Photosynthesis in plants 6M

(OR)

10. a) Demonstrate the energy yield in Krebs cycle 6M
- b) Evaluate the process of CO₂ fixation through the Kelvin cycle 6M

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) What is per capita demand? Mention and discuss the factors that influence per capita demand. 8
- b) Name different methods of population forecasting and explain any three methods briefly 6

(OR)

2. a) Explain briefly about physical examinations of drinking water standards 8
- b) What is design period? What are the factors affecting design period. 6

UNIT-II

3. a) Explain the surface sources and sub surface sources of water. 8
- b) What is an intake structure? What are the different types of intake structures 6

(OR)

4. a) Explain different techniques used in determining reservoir capacity. Explain any one of them. 8
- b) Explain briefly about equivalent pipe method 6

UNIT-III

5. a) Explain with relevant chemical equations, how alum acts as coagulant. 6
- b) What is the principle of plane sedimentation with a neat sketch 8

(OR)

6. a) What is coagulation and properties required in a coagulant? 6
- b) Design a rectangular sedimentation tank to supply water for a population of 50,000 with an assured average supply of 135 lpcd. Detention time of the tank is 4 hours. Assume data needed suitably. 8

UNIT-IV

7. a) Write short note chlorination and explain different types of chlorination processes. 6
- b) Design six slow sand filter beds from the following data: 8
 - Population to be served = 50,000 persons.
 - Per capita demand = 150 lt/head/day.
 - Rate of filtration = 180 lt/hr/sq.m.
 - Length of each bed = Twice the breadth.
 - Assume maximum demand as 1.8 times the average daily demand. Also assume that one unit, out of six, will be kept as stand-by.

(OR)

8. a) What are the various forms in which chlorine can be applied? Discuss. 4
- b) Write the difference between slow and rapid sand filters. 10

UNIT-V

9. Explain briefly the various Disposal Methods of Solid Waste for effective Management. 14

(OR)

10. a) Differentiate non-hazardous and hazardous waste 4
- b) Explain briefly about disposal of municipal solid waste by land filling method with a sketch. 10

Time: 3 Hours**Max Marks: 70**

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Explain the constructional features of a DC machine with the help of neat sketches? 7M
- b) A 4-pole generator having wave wound armature winding has 51 slots each slot contains 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm, assuming the flux per pole to be 7.0 mWb? 7M

(OR)

2. a) Derive an expression for torque developed in the armature and shaft of DC motor 7M
- b) The Armature of an 8-pole DC generator has 960 conductors and runs at 400 rpm. The flux per pole is 40 mWb. Calculate the induced EMF, if the armature is: (i) Lap-wound, (ii) Wave wound. 7M

UNIT-II

3. Explain transformer open circuit and short circuit tests to determine efficiency of the transformer 14M

(OR)

4. a) Explain about core type and shell type transformers 7M
- b) A 1-phase, 4 kVA Transformer has 400 Primary turns, and 1000 secondary turns. The net cross sectional area of the core is 60cm². When the primary is connected to 500V, 50Hz supply, calculate: (i) The Maximum flux density in the core (ii) The Voltage Induced in secondary winding. 7M

UNIT-III

5. a) A 3-phase, 4-pole induction motor is supplied from 3-phase, 50Hz AC supply. Calculate (i) synchronous speed (ii) rotor speed when slip is 4% and (iii) rotor frequency when rotor runs at 600rpm. 7M
- b) Derive the expression for the Torque of an Induction motor & obtain the condition for maximum, torque. 7M

(OR)

6. a) Explain the principle of operation of induction motor. 7M
- b) Explain torque slip characteristics of three phase induction motor. 7M

UNIT-IV

7. a) Derive the emf equation of an alternator. 7M
- b) Explain the OC and SC test of an alternator. How regulation can be calculated by the use of their result. 7M

(OR)

8. Differentiate between the constructional features of salient pole synchronous machine and round rotor synchronous machine. 14M

UNIT-V

9. Explain the construction and working of a PMMI instrument. 14M

(OR)

10. a) Write the advantages and disadvantages of PMMC and MI instruments. 8M
- b) What is the importance of damping torque in an indicating instrument? Explain about (i) air friction damping (ii) fluid friction damping (iii) eddy current damping. 6M

2 of 2

**FLUID MECHANICS AND HYDRAULIC MACHINERY
(Mechanical Engineering)****Time: 3 Hours****Max Marks: 70**

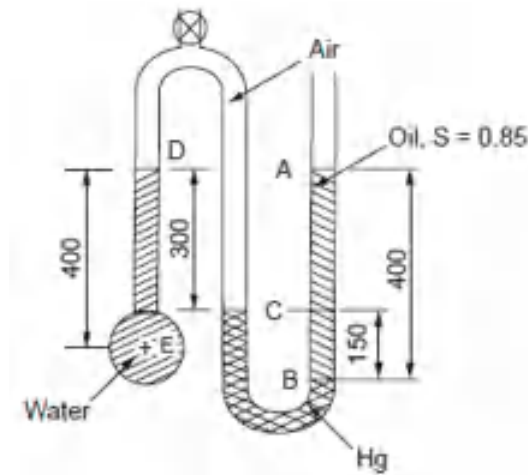
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- 1 A compound manometer is used to measure the pressure in pipe E carrying water. [14]
The dimensions are shown in Figure. Determine the pressure in the pipe.

**(OR)**

2. a) Distinguish between i. Steady & Unsteady, ii. Uniform & Non-uniform, iii. [7]
Laminar & Turbulent, iv. Rotational & Irrotational flows.
b) For given $u = kx$ in a two dimensional flow determine v . [7]

UNIT-II

3. Define the Bernoulli's theorem and derive Bernoulli's equation by mentioning the [14]
assumptions made.

(OR)

4. a) Explain the principle of Orifice meter with neat sketch. Derive an equation for the [7]
rate of flow through it.
b) State Momentum equation. How will you apply momentum equation for [7]
determining the force exerted by a flowing liquid on a pipe bend?

UNIT-III

- 5 a) Differentiate between (i) Major energy loss and Minor energy loss (ii) Pipes in [9]
series and Pipes in parallel.
b) Derive an expression for the force exerted on an inclined plate moving in the [5]
direction of the jet.

(OR)

6. a) A jet of water strikes with a velocity of 40 m/sec a flat fixed plate inclined at 45° with the axis of the jet. The cross sectional area of the plate is 120 cm^2 . Find the force exerted by the jet on the plate and the ratio in which the jet gets divided after striking. [7]
- b) Determine the diameter of the pipe (smooth) required conveying 150 lit of kerosene over a length 1000 m with the loss of head by friction limited to 10 m of kerosene. Density = 810 kg/m^3 , kinematic viscosity = $2.37 \times 10^{-6} \text{ m}^2/\text{s}$ [7]

UNIT-IV

7. A Francis turbine developing 16120 kW under an head of 260 m runs at 600 rpm. The runner outside diameter is 1500 mm and the width is 135 mm. The flow rate is $7 \text{ m}^3/\text{s}$. The exit velocity at the draft tube outlet is 16 m/s. Assuming zero whirl velocity at exit and neglecting blade thickness determine the overall and hydraulic efficiency and rotor blade angle at inlet. Also find the guide vane outlet angle. [14]

(OR)

8. a) A Francis turbine works under a head of 120 m. The outer diameter and width are 2 m and 0.16 m. The inner diameter and width are 1.2 m and 0.27 m. The flow velocity at inlet is 8.1 m/s. The whirl velocity at outlet is zero. The outlet blade angle is 16° . Assume $\eta_H = 90\%$. Determine, power, speed and blade angle at inlet and guide blade angle. [9]
- b) What is cavitation? How does it affect the performance of hydraulic machines? [5]

UNIT-V

9. a) Explain what is meant by slip. What are the effects of slip? [5]
- b) A double acting reciprocating pump, running at 40 r.p.m is discharging $1 \text{ m}^3/\text{minute}$. The pump has a stroke of 400mm. The diameter of the piston is 200mm. The delivery and suction head are 20m and 5m respectively. Find the slip of the pump and power required [9]
- (OR)**
10. a) Explain the function of air vessel. [5]
- b) It is desired to have a discharge of water of 10 l/min using a reciprocating pump running at 42 rpm. The bore to stroke ratio is to be 1 : 1.5. It is expected that the slip will be 12%. Determine the bore and stroke for (a) single acting pump, and (b) double acting pump. If the total head is 30 m and the overall efficiency is 82%, determine the power required in both cases. [9]

AR16

CODE: 16BS2005

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech I Semester Supplementary Examinations, March-2021

PROBABILITY AND STATISTICS

(Common to CSE & IT)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

- 1 A random variable X has the following probability function [14M]

X = x	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K

Determine (i) K (ii) Expectation (iii) Variance

(OR)

- 2 Find the probabilities that a random variable having the standard normal distribution will take on a value [14M]
- (i) between 0.87 and 1.28,
 - (ii) between - 0.87 and 0.62,
 - (iii) greater than 0.85,
 - (iv) greater than -0.65.

UNIT-II

3. a) If 3 of 20 tyres are defective and 4 of them are randomly chosen for inspection, what is the probability that only one of the defective tyre will be included ? [7M]
- b) A manufacturer knows from experience that the resistance of resistors he produces in normal with mean 100 ohms and standard deviation 2 ohms. What percentage of resistors will have resistance between 98 ohms and 102 Ohms? [7M]

(OR)

4. Fit a Poisson distribution for the following data and calculate the expected frequencies [14M]

x	0	1	2	3	4	5
f(x)	42	33	14	6	4	1

UNIT-III

5. A population consists of five numbers 2, 3, 6, 8, 11. Consider all samples of size two that can be drawn without replacement from this population. Find [14M]
- (a) The population mean.
 - (b) The population S.D
 - (c) The mean of the sampling distributions of means
 - (d) The standard deviation of the sampling distribution of means

(OR)

6. a) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. [7M]
Construct 98% confidence interval.
- b) Find 95% confidence limits for the mean of a normally distributed population from [7M]
which the following sample was taken 15,17,10,18,16,9,7,11,13,14.

UNIT-IV

7. a) A test of the breaking strengths of 6 ropes manufactured by a company showed a [6M]
mean breaking strength of 7750 lb and a strength deviation of 145 lb, whereas
the manufacturer claimed a mean breaking strength of 8000 lb. Can we support
the manufacturer's claim at a level of significance of 0.05?
- b) It is desired to determine whether there is less variability in the silver plating [8M]
done by company 1 than in that done by company 2. If independent random
samples of size 12 of the two company's work yield $s_1 = 0.035$ and
 $s_2 = 0.062$, test the null hypothesis $\sigma_1^2 = \sigma_2^2$ against the alternative
hypothesis $\sigma_1^2 < \sigma_2^2$ at the 0.05 level of significance.

(OR)

8. a) In a random sample of 60 workers, the average time taken by them to get to work [7M]
is 33.8 minutes with a S.D of 6.1 minutes. Can we reject the null hypothesis $\mu =$
32.6 minutes in favour of alternative null hypothesis $\mu > 32.6$ at $\alpha = 0.025$ level of
Significance.
- b) Define (i) Type-I error (ii) Type-II error and (iii) Critical region [7M]

UNIT-V

9. a) Explain the correlation and regression. [6M]
- b) Fit a power curve ($y=ab^x$) from the following data pertains to the demand for a [8M]
product (in thousands of units) and its price (in dollars) charged in five different
market areas.

Price (x)	20	16	10	11	14
Demand(y)	22	41	120	89	56

OR

10. Fit a second degree parabola ($y = a+bx+cx^2$) to the following data by the method [14M]
of least squares.

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

PART-A**ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1. a) What is the working principle of DC Generator?
b) What is the function of commutator in DC machine?
c) What is the condition for maximum efficiency of a Transformer?
d) Which losses are called variable losses in transformer?
e) Define slip of an Induction motor.
f) What is the rating of the transformer?
g) What is the rating of the Alternator?
h) What is the EMF equation of DC generator?
i) Purpose of damping torque in electrical measuring instrument.
j) Purpose of deflecting torque in electrical measuring instrument.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. a) Explain the constructional features of a DC machine with the help of neat sketches? 8M
b) A 4-pole generator having wave wound armature winding has 51 slots each slot contains 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm, assuming the flux per pole to be 7.0 mWb? 4M

(OR)

3. a) Deduce the expression for torque developed in the armature of a DC motor? 8M
b) Determine the torque established by the armature of a four-pole D.C. Motor having 774 conductors, two paths in parallel, 24 milli-webers of pole-flux and the armature current is 50 Amps. 4M

UNIT-II

4. Explain transformer open circuit and short circuit tests to determine efficiency of the transformer 12M

(OR)

5. a) Write the expression for efficiency of a transformer? Derive the condition for maximum efficiency? 8M
b) A 500 kVA, 3-phase transformer has iron losses of 300 W and full load copper losses of 600 W. Find the Maximum efficiency of the Transformer. 4M

UNIT-III

6. a) Explain torque slip characteristics of three phase induction motor. 8M
b) An 8-pole, 3-phase, 50 Hz induction motor is operating at a speed of 700 rpm. The frequency of the rotor current of the motor in Hz is 4M

(OR)

7. a) Explain in detail about the various starting methods used to start a three-phase induction motor 8M
b) What is slip? Obtain the frequency of rotor currents when the motor is rotating with speed 'N' 4M

UNIT-IV

8. a) Discuss in detail about the constructional details of three- phase alternator 6M
b) Explain principle of operation of alternator. 6M
(OR)
9. a) Distinguish between salient pole & cylindrical rotor configuration. 8M
b) A 3-phase star connected alternator has 8-poles and runs at 750 rpm. It has 24 slots/phase and 10 conductors per slot, the flux being 0.055 Wb/pole. Calculate the line voltage 4M

UNIT-V

10. Explain the construction and working of a PMMI instrument. 12M
(OR)
11. a) Describe the various operating torques needed for proper operation of an analog indicating instruments 6M
b) How is the current range of a PMMC instrument extended with the help of shunt resistor? Derive the expression for shunt resistor 6M

AR13

CODE: 13BS2007

SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

II B.Tech I Semester Supplementary Examinations, March-2021

COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CIVIL & MECH)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Write the definition of Analytic function
- b) Cauchy-Riemann equations for the function $w = f(z) = u(r, \theta) + iv(r, \theta)$ in polar coordinators (r, θ) are -----
- c) The value of the integral $\oint_C (x^2 - y^2 + 2ixy)dz$ where C is the contour $|z| = 1$
- d) If $f(z) = \frac{e^z}{z^2 + 1}$ then singularities of $f(z)$ are -----
- e) Given $f(z) = \left(\frac{z+1}{z^2+1}\right)^2$, then write the zeros of $f(z)$ and their orders
- f) Write Bilinear transformation formula.
- g) If E_1 and E_2 are two events in a sample space S and $P(E_1) \neq 0$ then the formula for the probability of E_2 , after the event E_1 has occurred is -----
- h) Mean and variance of a Binomial distribution are -----, -----
- i) Write the formula for standard error of a sample proportion
- j) Explain about two tailed test in test of significance

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. If $w = \phi + i\psi$ represents the complex potential for an electric field and $\psi = x^2 - y^2 + \frac{x}{x^2 + y^2}$, find ϕ . 12 M

(OR)

3. a) Show that $f(z) = xy + iy$ is everywhere continuous but not analytic 6M
- b) Evaluate $\oint_C \frac{4-3z}{z(z-1)(z-2)} dz$ using Cauchy's integral formula. Where C is the circle $|z| = \frac{3}{2}$ 6M

UNIT-II

4. a) Find the poles and residues at each pole of the function $f(z) = \frac{z^2}{z^4 - 1}$ 6M
- b) Use residue theorem to evaluate $\oint_C \frac{e^z dz}{(z-1)^2}$ where C is the circle $|z| = 2$ 6M
- (OR)
5. Show that $\int_0^{2\pi} \frac{\cos 2\theta}{1 - 2a \cos \theta + a^2} d\theta = \frac{2\pi a^2}{1 - a^2}, (a^2 < 1)$ 12M

UNIT-III

6. a) Find the image of the infinite strip bounded by $x = 0$ & $x = \pi/4$ under the transformation $w = \cos z$ 6 M
- b) Find the bilinear transform which maps the points $(\infty, i, 0)$ into the points $(0, i, \infty)$ 6 M
- (OR)
- 7 Find the bilinear transform which maps the points $(2, i, -2)$ into the points $(1, i, -1)$ 12 M

UNIT-IV

- 8 The probability that the life of a bulb is 100 days is 0.05. Find the probability that out of 6 bulbs (i) At least one (ii) greater than four (iii) none and iv) less than 2, will be having a life of 100 days. 12 M
- (OR)
9. a) If the mean of breaking strength of copper wire is 575 lbs., with a standard deviation of 8.3 lbs. How large a sample must be used in order that there will be one chance in 100 that the mean breaking strength of the sample is less than 572 lbs ? 6 M
- b) Find the mean and standard deviation of sampling distribution of variances for the population 2,3,4,5 by drawing samples of size two with replacement. 6 M

UNIT-V

10. a) Explain about one tailed and two tailed tests 6 M
- b) A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs. and standard deviation 25kgs. 6 M
- (OR)
11. a) A sample of the height of 6400 Englishmen has a mean of 67.85 inches and a S.D of 2.56 inches while a simple sample of heights of 1600 Australians has a mean of 68.55 inches and S.D of 2.56 inches. Do the data indicate the Austrians are on the average taller than the Englishmen? 6 M
- b) In a sample of 500 from a village in Rajasthan, 280 are found to be wheat eaters and the rest rice eaters. Can we assume that the both articles are equally popular? 6 M

II B.Tech I Semester Supplementary Examinations, March-2021

PROBABILITY AND STATISTICS

(Common to CSE and IT)

Time: 3 Hours

Max Marks: 70

PART-A

ANSWER ALL QUESTIONS

[1 x 10 = 10 M]

1. a) Define the conditional probability.
- b) Write the mean of a Binomial distribution
- c) What is the total area under the normal distribution curve
- d) Define Normal distribution
- e) Define Null Hypothesis.
- f) Define the level of significance
- g) Define correlation coefficient.
- h) Write the control limits of \bar{X} chart
- i) Write the regression equation of Y on X
- j) Define steady state solutions

PART-B

Answer one question from each unit

[5x12=60M]

UNIT-I

2. A random variable X has the following probability function

12M

X = x	1	2	3	4	5	6
P(X)	K	3K	5K	7K	9K	11K

- (i) Determine (i) K (ii) Expectation (iii) Variance

(OR)

3. a) A firm has four plants producing the same item at all plants. The first plant produces 20% of the total production, second plant 25%, third plant 40% and the fourth plant 15%. The firm has a single warehouse to store. From the past records it has been found that 0.01, 0.06, 0.03 and 0.02 of the items produced at plants 1, 2, 3 & 4 respectively are defectives. Before the shipment of the items to a dealer, one unit is selected and found defective. What is the probability that the item was produced in plant 3? **6M**
- b) The total no. of hours, measured in units of 100 hours that a family runs a vacuum cleaner over a period of one year is a continuous random variable X that has the probability density function. **6M**

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 2 - x, & 1 \leq x \leq 2 \\ 0, & \text{otherwise} \end{cases}$$

Find the probability that over a period of one year, a family runs their vacuum cleaner

- i) less than 120 hours (ii) between 50 and 150 hours
(iii) more than 175 hours (iv) mean.

UNIT-II

4. a) Seven coins are tossed and number of heads noted. The experiment is repeated 128 times and the following distribution is obtained : **6M**

No. of heads	0	1	2	3	4	5	6	7	Total
Frequencies	7	6	19	35	30	23	7	1	128

Fit a binomial distribution.

- b) The mean yield for one-acre plot is 662 kilos with a s.d. 32 kilos. **6M**
Assuming normal distribution, how many one-acre plots in a batch of 1,000 plots would you expect to have yield
(i) over 700 kilos, (ii) below 650 kilos.

(OR)

- 5 A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size two which can be drawn without replacement from this population. Find **12M**
(i) The population mean
(ii) The population standard deviation
(iii) The mean of the sampling distribution of means
(iv) The standard deviation of the sampling distribution of Means.

UNIT-III

6. a) According to the norms established for a mechanical aptitude test, persons who are 18 years old have an average height of 73.2 with a standard deviation of 8.6. If 40 randomly selected persons of that age averaged 76.7, test the hypothesis against the alternative hypothesis at the 0.01 level of significance. **6M**

- b) Before an increase in excise duty on tea, 800 persons out of a sample of 1,000 persons were found to be tea drinkers. After an increase in duty, 800 people were tea drinkers in a sample of 1,200 people. Using standard error of proportion, state whether there is a significant decrease in the consumption of tea after the increase in excise duty ? **6M**

(OR)

- 7 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. **12M**

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

UNIT-IV

8. Fit a linear equation of the form $y = a + bx$ to the following data.

12M

X	10	12	13	16	17	20	25
Y	10	22	24	27	29	33	37

(OR)

9. a) The following data gives readings 10 samples of size 6 each in the production of a certain component. 6M

Sample	1	2	3	4	5	6	7	8	9	10
Mean \bar{X}	383	508	505	582	557	337	514	614	707	753
Range R	95	128	100	91	68	65	148	28	37	80

Draw control charts for \bar{X} (for $n = 6$, $A_2 = 0.483$). What is your conclusion.

- b) The following data refer to the number of defectives in 10 samples of 100 items each. Construct an appropriate control units. 6M

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	4	8	11	3	11	7	7	16	12	6

UNIT-V

10. a) Define a queue and also explain the queuing system. 6M

- b) Arrival rate of telephone calls at a telephone booth are according to Poisson distribution with an average time of 12 minutes between two consecutive call arrivals. The length of telephone calls is assumed to exponentially distribution with mean 4 minutes. 6M

- Find the probability that a caller arriving at the booth will have to wait.
- Find the average queue length that forms from time to time.
- Find the fraction of a day that the phone will be in use.

(OR)

11. a) Explain (M/M/C) model with finite and infinite capacity. 6M

- b) Customers arrive at a window drive in PCT service station according to poisson distribution with a mean rate of 4 per minute. Service time per customer is exponential with a mean of 3 minutes. The space in front of the window including that for the serviced car, can accommodate a maximum of three cars. Other cars can wait outside this space, 6M

- What is the probability that an arriving customer car drives directly to the space in front of the window?
- What is the probability that an arriving customer will have to wait outside the indicated space?
- Find the average queue length.