

**R16**

Code No: 132AC

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year II Semester Examinations, August - 2018****MATHEMATICS - III****((Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, MIE, PTM, CEE, MSNT))****Time: 3 hours****Max. Marks: 75**

**Note:** This question paper contains two parts A and B.  
Part A is compulsory which carries 25 marks. Answer all questions in Part A.  
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) Find the mean and variance of the probability distribution having pdf,  $f(x) = e^{-x}, x > 0$ . [2]
- b) A fair coin is tossed until a head or consecutive five tails occurs. Find the discrete probability distribution. [3]
- c) Write the conditions of validity of  $\chi^2$ -test. [2]
- d) Construct sampling distribution of means for the population 3, 7, 11, 15 by drawing samples of size two without replacement. Determine i)  $\mu$  ii)  $\sigma$  iii) Sampling distribution of means. [3]
- e) Discuss types of errors of the test of hypothesis. [2]
- f) Give the graphical interpretation of the bisection method. [3]
- g) Write the iterative formula for finding  $\sqrt[n]{N}$  using method of false position. [2]
- h) Explain briefly about method of least square. [3]
- i) Derive Trapezoidal rule for computing integral  $\int_a^b f(x)dx$ . [2]
- j) What are the limitations of Taylor's series method? [3]

**PART-B****(50 Marks)**

- 2.a) Let  $f(x) = 3x^2$ , when  $0 \leq x \leq 1$  be the probability density function of a continuous random variable X. Determine  $a$  and  $b$  such that  
i)  $P(X \leq a) = P(X > a)$  ii)  $P(X > b) = 0.05$ .  
b) Probability density function of a random variable X is  
$$f(x) = \begin{cases} \frac{1}{2} \sin x, & 0 \leq x \leq \pi \\ 0, & \text{elsewhere} \end{cases}$$
  
Find the mean, mode and median of the distribution. [5+5]

**OR**

- 3.a) A die is cast until 6 appears. What is the probability that it must be cast more than 5 times?
- b) The marks obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine:  
i) What was the highest mark obtained by the lowest 25% students?  
ii) Within what limit did the middle 90% of the student lie? [5+5]

- 4.a) Explain why the larger variance is placed in the numerator of the statistic F. Discuss the application of F-test in testing if two variances are homogenous.
- b) A sample of 11 rats from a central population had an average blood viscosity of 3.92 with a standard deviation of 0.61. Estimate the 95% confidence limits for the mean blood viscosity of the population. [5+5]

OR

- 5.a) The mean voltage of a battery is 15 and standard deviation 0.2. Find the probability that four such batteries connected in series will have a combined voltage of 60.8 or more volts.
- b) Discuss critical region and level of significance with example. [5+5]
- 6.a) Suppose the diameter of motor shafts in a lot have a mean of 0.249 inches and standard deviation of 0.003 inches. The inner diameter of bearings in another lot have a mean of 0.255 inches and standard deviation of 0.002 inches. If a shaft and bearing are selected at random, find the probability that the shaft will not fit inside the bearing. Assume that both dimensions are normally distributed.
- b) A sample of 400 items is taken from a normal population whose mean is 4 and variance 4. If the sample mean is 4.45, can the samples be regarded as a simple sample? [5+5]

OR

7. In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether two colleges are significantly different with respect to the habit of using ball pens? [10]
8. Estimate  $y$  at  $x = 5$  by fitting a least squares curve of the form  $y = \frac{b}{x(x-a)}$  to the following data [10]

$x$	3.6	4.8	6.0	7.2	8.4	9.6	10.8
$y$	0.83	0.31	0.17	0.10	0.07	0.05	0.04

OR

9. Show that the Gauss-Seidel methods diverge for solving the system of equations  $2x + 3y + z = -1$ ;  $3x + 2y + 2z = 1$ ;  $x + 2y + 2z = 6$ . [10]
10. Find the successive approximate solution of the differential equation  $y' = y$ ,  $y(0) = 1$  by Picard's method and compare it with exact solution. [10]

OR

11. Use Runge-Kutta method of order four to find  $y$  when  $x = 0.6$  in steps of 0.2 given that  $\frac{dy}{dx} = 1 + y^2$ ,  $y(0) = 0$ . [10]

--ooOoo--

**R15**

Code No: 121AE

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech I Year Examinations, August - 2018****ENGINEERING CHEMISTRY****(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, AE, MIE, PTM, CEE)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- |      |   |     |
|------|---|-----|
| 1.a) | What is Pilling-Bedworth rule?  | [2] |
| b)   | What is Electrochemical series?   | [3] |
| c)   | Explain why natural rubber need vulcanization.                          | [2] |
| d)   | What is refractory and refractoriness?                                  | [3] |
| e)   | What is priming? How can it be prevented?                               | [2] |
| f)   | What are the specifications of potable water?                           | [3] |
| g)   | Give the classification of the fuels with suitable examples.            | [2] |
| h)   | Define gross and net calorific value and give their inter relationship. | [3] |
| i)   | What is triple point?   | [2] |
| j)   | Derive an expression for Freundlich adsorption isotherm.                | [3] |

**PART-B****(50 Marks)**

- |           |   |       |
|-----------|---|-------|
| 2.a)      | Give the mechanism of electrochemical corrosion of iron.                          |       |
| b)        | What is Concentration cell? Explain with an example.                              | [5+5] |
| <b>OR</b> |   |       |
| 3.a)      | Derive Nernst equation and explain its applications.                              |       |
| b)        | Discuss the various factors influencing the rate of corrosion.                    | [5+5] |
| 4.a)      | What are conducting polymers? Explain the conduction mechanism in polyacetylenes. |       |
| b)        | What is a lubricant? Give the characteristics of good lubricants.                 | [5+5] |
| <b>OR</b> |   |       |
| 5.a)      | How do you prepare nanomaterials by chemical vapour deposition method?            |       |
| b)        | What are Biodegradable polymers? Explain their advantages.                        | [5+5] |
| 6.a)      | Explain the complexometric method of determination of the hardness of water.      |       |
| b)        | What are Scales and sludges and explain their prevention methods?                 | [5+5] |

**OR**

7.a) Calculate the amount of lime and soda required in kg for softening 10,000L of water containing following impurities.

$\text{Ca}(\text{HCO}_3)_2=1.62\text{mg/L}$ ,  $\text{CaSO}_4=0.34\text{mg/L}$ ,  $\text{NaCl}=0.75\text{mg/L}$ ,  $\text{MgCl}_2=0.95\text{mg/L}$ .

b) What is internal treatment of boiler water? Give an account on calgon conditioning. [5+5]

8.a) How is nitrogen determined in a solid fuel?

b) What is flue gas? How is it analysed by Orsats apparatus?

[5+5]

OR

9.a) How the calorific value of a gaseous fuel is determined by Junker's gas calorimeter?

Explain with a neat diagram.

b) Explain Proximate analysis of coal. How is it different from ultimate analysis? [5+5]

10.a) Describe the phase diagram of lead-silver system.

b) Discuss classification and optical properties of colloids.

[5+5]

OR

11.a) What are the differences between physisorption and chemisorptions?

b) Explain the phase changes in water system with the help of phase diagram.

[5+5]

---ooOoo---