UNIT IV: PROBABILITY SPPU QUESTIONS

1. A problem in Maths is given to three students A, B, C whose chances of solving it are $1/2, 1/3, 1/4$ respectively. What is the probability that the problem will be solved?

2. A box A contains 2 white and 4 black balls, another box B contains 5 white and 7 black balls. A ball is transferred from the box A to the box B, and then a ball is drawn from the box B. Find the probability that it is white.

3. 'A' is one of the eight horses entered for a race and is to be ridden by one of the tow jockeys B and C. It is 2 of 1 that B rides A, in which case all the houses are equally likely to win, whereas with rider C A's chance is doubled. (i) Find the probability that A wins, (ii) what are odds against A's winning?

4. A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C times in shots what is the probability that two shots hit atleast two shots hits?

5. A, B, C throw the coin alternatively in that order. One who gets tail first wins the game. Find the probability of B winning the game if C has a start.

6. An envelope contains 6 tickets with numbers 1, 2, 3, 5, 6, 7. Another envelope contains 4 tickets with number 1,3,5,7. An envelope is chosen at random and ticket is drawn from it. Find the probability that the ticket bears the numbers (i) 2 or 5, (ii) 2.

7. The probability that a pen manufactured by a company will be defective is 1/10. If 12 such pens are manufactured, find the probability that (a) exactly two, (b) atleast two, (c) none will be defective.

8. If 10% of bolts produced by a machine are defective, then determine the probability that out of 10 bolts chosen at random (a) one, (b) none, (c) atmost 2 bolts will be defective?

9. In 100 sets of 10 tosses of a coin, in how many ways do you expect (a) 7 heads and 3 tails, (b) atleast 7 heads.

10. In sampling a large number of parts manufactured by a machine, the mean number of defective in a sample of 20 is 2. Out of 1000 such samples, how many would be expected to contain atleast 3 defective parts?

11. In a telephone exchange, the probability that any one call is worngly connected is 0.02. What is the minimum number of calls required to ensure a probability 0.1 that atleast one call is wrongly connected?

12. Suppose that a book of 600 pages contains 40 printing mistakes. Assume that these errors are randomly distributed thoughout the book and x the number of errors per page has a Poisson distribution. What is the probability that 10 pages selected at random will have (a) not more than 2 errors, (b) free from errors.

13. In a certain factory producing cycle tyres, there is a small chance of 1 in 500 tyres to be defective. The tyres are supplied in lots of 10. Using Poisson distribution, calculate the approximate number of lots containing no defective, one defective and two defective tyres, respectively in a consignment of 10000 lots.

14. Fit a Poisson distribution to the following date and hence calculate theoretical frequencies

	0	1	2	3	4
	46	38	22	9	1

15. In a town 10 accidents took place in a span of 50 days. Assume that the number of accidents per day follows Poisson distribution. Find the probability that there will be 3 or more accidents in a day.

16. Fit a Poisson distribution to the following date and hence calculate theoretical frequencies

	0	1	2	3	4
	122	60	15	2	1

17. In a certain factory turning out razor blades there is a small chance of 1/500 for any blade to be defective. The blades are supplied in a packet of 10. Calculate approximate number of packets containing no defective and 2 defective blades in a consignment of 10,000 packets.

18. In a sample of 1000 candidates, the mean fo certain test is 14 and standard deviation is 2.5. Assuming that data is normally distributed, find (a) how many scores below 8, (b) how many scores between 12 and 13, (c) how many scores above 15? (Given: For z=2.4 area A=0.4918, z=0.8 area A=0.2881, z=0.4 area A=0.1554)

19. In a test on 2000 electric bulbs, it was found that the life of a particular bulb was normally distributed with an avg life of 2040 hrs and standard deviation of 60 hrs. Estimate the number of bulbs likely to burn for (a) more than 2150 hrs (b) less than 1950 hrs, (c) more than 1920 hrs but less than 2160 hrs.
(Given: For z=1.83 area A=0.4664, z=1.5area A=0.4332, z=2 area A=0.4772).

20. A sample of 100 dry battery cells were tested to find the length of life. If the mean is 12 hrs and standard deviation is 3 hrs, assuming that data to be normally distributed, how many battery cells are expected to have life (a) more than 15 hrs, (b) less than 6 hrs, (c) between 10 and 14 hrs.
(Given: For z=1 area A=0.3413, z=0.67
area A=0.2486, z=2 area A=0.4772).

21. In a normal distribution 7% of the items are under 35 and 89% are under 63. Find the mean and standard deviation.
(Given: For z=1.475 area A=0.43, z=1.226 area A=0.39).

22. In a certain city 2000 electric lamps are installed. If the lamps have average life of 1000 burning hrs with standard deviation of 200 hrs then (a) what number of lamps might be expected to fail in the first 700 burning hrs? (b)after what period of burning hrs 10% of lamps would still be burning? (Given: For z=1.5 area A=0.4332, z=1.28 area A=0.4).

23. A random sample of 200 bolts is drawn from a population which represents the size of bolts. If a sample is distributed normally with a mean 3.15 cm and standard deviation 0.025 cm, find expected number of bolts whose size falls between3.12 cm and 3.2 cm. (Given: For z=1.2 area A=0.3849, z=2 area A=0.4772).

24. A die is thrown 264 times with the following results:

No.appear on die	1	2	3	4	5	6
Frequency	40	32	28	50	54	60

Show that the die is biased (for 5 degrees of freedom at 5% level of significance = 11.07).

25. 20% of the bolts produced by the machine are defective. Determine probability that out of 4 bolts chosen at random a) 1 is defective ii) zero is defective. iii) Atmost 2 bolts are defective

26. On an average a box containing 10 articles is likely to have 2 defectives. If we consider 100 boxes, how many of them expected to have three or less defectives ?

27. There is small probability of $\frac{1}{1000}$ for computer produced to be defective. Determine in sample of 2000 computers the probability that there are i) no defective ii) 2 defective

28. If 10% of the rivets produced by a machine are defective, find the probability that out of 5 rivets chosen at random i) none will be defective ii) one will be defective iii) at least two will be defective.

29. The average number of misprints per page of a book is 1.5 assuming the number of misprints to be Poisson, Find i) the probability that a particular book is free from misprints.
ii) Number of pages containing more than one misprint if book contains 90 pages.

30. An unbiased coin is thrown 10 times. Find the probability of getting exactly 6 heads, at least 2 heads.