

MIT—1.1.4 (R & B)

PG-1st Semester Examination, 2021-22 (R & B)

Subject : MIT

Paper – 1.1.4 (PSP)

Full Marks : 80

Time : 3 hours

Answer all questions.

*The figures in the right-hand margin
indicate marks.*

*Candidates are required to give their answers
in their own words as far as practicable.*

1. Find the probability of getting a King or a Heart when a card is drawn from a pack of 52 playing cards.

16

Or

- (a) Explain mutually exclusive events with suitable example.

8

- (b) Find the probability of getting an even number when a fair die is rolled ?

8

(Turn Over)

2. (a) It is known that any item produced by a certain machine will be defective with probability 0.1, independently of any other item. What is the probability that in a sample of three items, at most one will be defective ? 8

- (b) Explain Geometric Random variable. 8

Or

- (a) If the number of accidents occurring on a highway each day is a Poisson random variable with parameter $\lambda = 3$, what is the probability that no accidents occur today ? 8

- (b) If X is uniformly distributed over $(0, 10)$, calculate the probability that (i) $X < 3$, (ii) $X > 7$? 8

3. (a) Find $E[X]$ where X is the outcome when we roll a fair die. 8

- (b) Define variance. Find $\text{Var}(X)$ when X represents the outcome when a fair die is rolled. 8

(3)

Or

(a) If a and b are constants, then prove that $E[ax + b] = a E[x] + b$. 8

(b) Define moment generating function. Find the moment generating function The Binomial Distribution with Parameters n and p . 8

4. Suppose that the chance of rain tomorrow depends on previous weather conditions only through whether or not it is raining today and not on past weather conditions. Suppose also that if it rains today, then it will rain tomorrow with probability α ; and if it does not rain today, then it will rain tomorrow with probability β . If $\alpha = 0.7$ and $\beta = 0.4$, then calculate the probability that it will rain four days from today given that it is raining today. 16

Or

Explain Gambler's Ruin Problem and solve the following problem by using it.

Suppose Max and Patty decide to flip pennies; the one coming closest to the wall wins. Patty, being the better player, has a probability 0.6 of winning on each flip. If Patty starts with five pennies and Max with ten, what is the probability that Patty will wipe Max out ?

16

5. Explain Birth & Death model. How to apply it with a real world situation explain with example.

16

Or

Explain open and closed system in Network of queues with examples.

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