

# Question bank

## Applied mathematics

### Unit test – I

**Q 1. Evaluate the following:**

1.  $\int \frac{\tan(\log x)}{x} dx$

2.  $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

3.  $\int \frac{e^{x(1+x)}}{\operatorname{cosec}(x e^x)} dx$

4.  $\int \cos^3 4x dx$

5.  $\int \tan^2 3x dx$

6.  $\int \frac{\cos x}{7 - \sin^2 x} dx$

7.  $\int \frac{1}{3x^2 - 5x + 4} dx$

8.  $\int \frac{1}{2 \cos^2 x - 3 \sin^2 x} dx$

9.  $\int \frac{1}{3 - 4 \sin x} dx$

10.  $\int \frac{1}{5 - 3 \cos x} dx$

11.  $\int \frac{3x+2}{x^2-5x+1} dx$

12.  $\int \frac{1}{\sqrt{3} \cos x - \sin x} dx$

13.  $\int \log x dx$

14.  $\int \tan^{-1} x dx$

15.  $\int \cos^{-1} x dx$

16.  $\int x \tan^{-1} x dx$

17.  $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$

18.  $\int e^{3x} \cos 2x dx$

19.  $\int x^2 \sin x dx$

20.  $\int \frac{\cos x}{(1 - \sin x)(2 - \sin x)} dx$

21.  $\int \frac{x^2+3x}{(x-1)(x-2)^2} dx$

22.  $\int \frac{4x^2-x}{(x+1)(x^2+2)} dx$

23.  $\int_0^1 x e^x dx$



Q 14. Solve  $xy \log y dx + (1 + x^2)dy = 0$  ---- (4M)

Q 15. Solve  $\frac{dy}{dx} = (4x + y + 1)^2$  ---- (4M)

Q 16. Solve  $(x^2 + y^2)dx - 2xydy = 0$  ---- (4M)

Q 17. Solve  $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$  ---- (4M)

Q 18. Solve  $x \log x \frac{dy}{dx} + y = 2 \log x$  ---- (4M)

Q 19. Solve  $\frac{dy}{dx} + y \tan x = \cos^2 x$  ---- (4M)

Q 20. Solve  $x \frac{dy}{dx} + y = \log x$  ---- (4M)

Q 21. Solve  $\frac{dy}{dx} = \frac{x-2y}{2x-4y}$  ---- (4M)

### **Probability**

Q 22. If A & B are two events such that  $P(A) = 1/2$ ,  $P(B) = 1/3$  &  $P(A \cap B) = 7/12$   
find  $P(A \cup B)$  ---- (3M)

Q 23. If three coins are tossed simultaneously, find the probability of getting  
almost 2 heads. ---- (3M)

Q 24. Two dice are rolled. Find the probability of getting a prime number as the  
sum of numbers on the top of dices. ---- (3M)

Q 25. From a pack of 52 cards, find the probability of getting 1 queen and 1 ace if  
two cards are drawn randomly. ---- (4M)

Q 26. A room has three electronics lamps. From a collection of 15 bulbs, 10 are  
good, 3 are selected at random and put in lamps. Find the probability that the  
room is lightened by at least one bulb. ---- (4M)

Q 27. An urn contains 10 red, 5 white and 5 black balls. Two balls are drawn at  
random. Find the probability that they are not of same colour. ---- (4M)

### **Probability Distribution**

Q 28. An unbiased coin is tossed 5 times, find the probability of getting at least 4  
heads. ---- (3M)

Q 29. In poisson distribution, if  $P(3) = P(4)$ , find  $P(1)$ . ---- (3M)

Q 30. Fit a Poisson distribution to set of following observations ---- (3M)

|       |     |    |    |   |   |
|-------|-----|----|----|---|---|
| $x_i$ | 0   | 1  | 2  | 3 | 4 |
| $f_i$ | 122 | 60 | 15 | 2 | 1 |

Q 31. If 30% of the bulbs are defective, find the probability that out of 4 bulbs

Selected a) one is defective      b) at the most two are defective. ---- (4M)

Q 32. Using poisson distribution, find the probability that the ace of spade will be

drown from a pack of cards at least once in 104 consecutive trials. ---- (4M)

Q 33. Assuming that 2 in 10 industrial accidents are due to fatigue, find the

probability that exactly 2 out of 8 accidents will be due to fatigue. ----(4M)

Q 34. A multiple choice test contains 20 questions. Each question has five choices

for correct answer. What is the probability of making an 80% with random

guessing. ---- (4M)

Q 35. 95% of students at college are between 1.1 m and 1.7m tall. Find mean and

S. D., assuming normal distribution. ---- (4M)