A

1. If X is the discrete random variable having the probability mass function, then   K   CO1- App value is .

X	1	2	5
P(X)	$9k^2$	$k^2 + 2k$	k

(a)1/5   (b) -1/5   (c) -1/2   (d) 1/2

2. A Continuous r.v has a p.d.f $f(x) = 3x^2, 0 \le x \le 1$, If $P(X > b) = 0.05$, then value of b is   CO1- App

(a) 0.9308   (b) 0.9803   (c) 0.9830   (d) 0.9038

3. Choose the correct relation between L_s, L_q, W_s & W_q CO6- U

(a) $\dfrac{L_s}{L_q} < \dfrac{W_s}{W_q}$ (b) $\dfrac{L_q}{L_s} > \dfrac{W_q}{W_s}$ (c) $\dfrac{L_q}{W_q} = \dfrac{L_s}{W_s}$ (d) $\dfrac{L_q}{W_q} < \dfrac{L_s}{W_s}$

4. For a model (M/M/1): (∞ /FCFS)The arrival rate is 3 per hour and service rate   CO2- App is 4 per hour then W_s

(a) 55 Minutes   (b) 65 Minutes   (a) 60 Minutes   (b) None of the above

5. One of the normal equation of parabola $y = a + bx + cx^2$ is   CO6- U

(a) $\Sigma xy = a\Sigma x + b\Sigma x^2 + c\Sigma x^3$ (b) $\Sigma xy = a\Sigma x^2 + b\Sigma x^3 + c\Sigma x^4$ (c) $\Sigma y^2 x = a\Sigma x^2 + b\Sigma x^3 + c\Sigma x^4$ (d) $\Sigma xy^2 = a\Sigma x + b\Sigma x^2 + c\Sigma x^3$

6. _____ number of normal equations are required to fit a straight line in method of least squares   CO6- U

   (a) 1   (b) 2   (c) 3   (d) 4

7. For a 3 ×3 matrix , 5, 10 are the Eigen values, trace of matrix is equal to 3 then dominant Eigen value   CO6- U

   (a) 12   (b) -12   (c) -13   (d) 10

8. Iteration method converges if $|g^1(x)|$ _____   CO6- U

   (a) >1   (b) <1   (c) =0   (d) >0

9. _____ prior values are required to predict the next value in Milne's method   CO6- U

   (a) 1   (b) 2   (c) 3   (d) 4

10. The first two steps of the fourth order Rungekutta method use -----   CO6- U

    (a) Backward Euler's method   (b) Taylor's series method

    (c) Forward Euler's method   (d) Euler's method

PART – B (5 x 2= 10Marks)

11. For Binomial distribution mean is 10 and variance is 4, Compute $P(X=2)$ CO1- App

12. Write down the little's formula   CO6- U

13. Write down the Normal Equations of the curve $y = ae^{bx}$ CO6- U

14. Write the condition of convergence of Newton's method   CO6- U

15. Write down the Adam's predictor and corrector formula.   CO5 U

PART – C (5 x 16= 80Marks)

16. (a) (i)) A RV X has the following distribution   CO1-Ana   (8)

x	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i) Calculate the value of 'k'

(ii) Calculate $P(X<5)$ & $P[1.5 < X < 4.5 / X > 2]$

(iii) Calculate Cumulative Distribution Function

(ii) Compute the moment generating function of Exponential distribution and hence find it's mean and variance   CO1-Ana   (8)

Or

(b) (i) A RV X has the following distribution   CO1 -Ana   (8)

x	0	1	2	3	4	5	6
P(X)	a	2a	2a	3a	3a	6a	8a

     (i).Compute $P(X \geq 2)$ and $E(X)$

     (ii) Compute $Var(X)$

(ii) If the density function of a continuous r.v X is given by   CO1 -Ana   (8)

$$f(x) = \begin{cases} ax & 0 \leq x \leq 1 \\ a & 1 \leq x \leq 2 \\ 3a - ax & 2 \leq x \leq 3 \\ 0 & otherwise \end{cases}$$

(a) Compute the value of "a"

(b) Compute the c.d.f of X

17. (a) Assume that the good trains are coming in a yard at the rate of 30   CO2 -Ana   (16)
trains per day and suppose that the inter arrival times follow an
exponential distribution. The service time for each train is assumed to
be exponential with an average of 36 minutes. If the yard can admit 9
trains at a time(there being 10 lines, one of which is reserved from
shunting purpose), Identify the Model ,Compute the probability that
the yard is empty and Compute the average queue length.

<div align="center">Or</div>

(b) Customers arrive at a watch repair shop according to a Poisson   CO2 -Ana   (16)
process at a rate of one per every 11 minutes, and the service time is
an exponential random variable with mean 6 minutes. Identify the
Model , Compute the following i) the average number of customers in
the shop L_s ii) the average time a customer spends in the shop W_s iii)
the average number of customers in the queue L_q iv) the probability
that the server is idle.

18. (a) (i) Applying least square method techniques fit a straight line   CO3- App   (8)
$y = a + bx$

	0	3	5	6	8	10	12
Y	2	5	8	9	11	12	15

(ii) Applying group average method fit a second degree parabola   CO3- App   (8)

$y = a + bx + cx^2$ for the following data

X	1	2	3	4	5
Y	5	12	26	60	97

(b) (i) Applying method of moments fit a straight line $y = ax + b$ CO3- App   (8)

X	1	3	5	7
Y	4	8.5	11.5	15

(ii) Applying least square method techniques fit the curve $y = ab^x$ with the following data: CO3-App   (8)

X	1	2	3	4	5
Y	150	99	60	48	18

19. (a) (i) Compute the real positive root of $x \log_{10} x = 4.5$ by Newton's Raphson Method. Correct to 3 decimal places   CO4-App   (8)

(ii) Using Gauss Seidel method, solve the following Equations   CO4-App   (8)
$3x - 13y - 3z = 49$, $5x - 6y + 17z = 45$, $11x + 2y - 2z = -31$

Or

(b) (i) Applying Power method compute numerically largest Eigen value of $\begin{pmatrix} 9 & 10 & 8 \\ 10 & 5 & -1 \\ 8 & -1 & 3 \end{pmatrix}$ by taking $X_0 = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$ CO4 -App   (8)

(ii) Compute the real positive root of $3x - \cos x = 1$ by Iterative method   CO4 -App   (8)

20. (a) (i) Using R.K Method of 4th order, solve $\frac{dy}{dx} = y - x^2$ with y (0.6) = 1.7379, Compute y (0.8) by taking h=0.2   CO5- App   (8)

(ii) Using Taylor series method Compute y(0.1) for   CO5- App   (8)

$\frac{dy}{dx} = x^2 y - 1$ with y(0) = 1

Or

(b) Given $\frac{dy}{dx} = x^3 + y$, $y(0) = 2$, $y(0.2) = 2.443$, $y(0.4) = 2.99$,   CO5- App   (16)

$y(0.6) = 3.68$, Compute $y(0.8)$ by Milne's Predictor & Corrector method

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