KUMARAGURU
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Register Number: ……

B.E DEGREE EXAMINATIONS: MAY 2015

(Regulation 2013)

Fourth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U13MAT410: Numerical Methods and Statistics

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Newton's formula converges in the interval if

   a) $|f(x)\,f'(x)| < f''(x)$ b) $|f(x)\,f''(x)| < \{f'(x)\}^2$

   c) $|f(x)|^2 < \{f'(x)\}^2$ d) $|f(x)\,f'(x)| < \{f''(x)\}^2$

2. If the eigen values of matrix $A - kI$ are $\lambda_i - k$ then eigen values of matrix A are _____.

3. Newton's forward interpolation formula is used only for

   a) equal intervals b) diagonal matrix

   c) Unequal intervals d) square matrix

4. To evaluate $\int_3^{4.2} (1+x)\,dx$ using Trapezoidal, Simpson's 1/3 rule and Simpson's 3/8 rule the proper choice of h will be _____ .

5. By Euler's method, the solution of $y' = x + y$ given $y(0) = 1$ for x = 0.2 is

   a) 0.1 b) 1

   c) 1.2 d) 0

6. The improved Euler method is based on the averages of _____.

7. Karl Pearson's coefficient of correlation is

   a) $r(X,Y) = \dfrac{Cov(X,Y)}{\sqrt{Var(X)}\sqrt{Var(Y)}}$ b) $r(X,Y) = \dfrac{E(X,Y)}{\sqrt{Var(X)}\sqrt{Var(Y)}}$

   c) $E(X,Y) = Cov(X,Y)Var(X,Y)$ d) $Cov(X,Y) = Var(X)Var(Y)$

8. The rank correlation coefficient lies between _____.

9. If X is a random variable having density function $f(x)=\begin{cases} x/3 & for \quad x=1,2,3 \\ 0\ , & otherwise \end{cases}$ then E(x) is

a) 5/3 b) 6

c) 2 d) 14/3

10. If X is a random variable and $\text{var}(x)=2$ then $\text{var}(4x+5)$ is _____.

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. What is the condition for the convergence to solve $x^3+x+1=0$ by iteration method?

12. Solve the linear system 4x – 3y = 11, 3x + 2y = 4 by Gauss Jordon method.

13. Using $\sin(0.1)=0.09983$ and $\sin(0.2)=0.19867$, find an approximate value of sin(0.15) by Lagrange's interpolation.

14. Write the first and second order derivatives of Newton's backward interpolation formula.

15. Find the value of k_1 if $y''+2y'-y=0$, $y(0)=0, y'(0)=1$ is solved by Runge-Kutta method of fourth order when h = 0.2.

16. What are the merits and demerits of the Taylor series method?

17. Calculate standard deviation for the following: 5, 10, 6, 15, 8, 25, 7.

18. Find the coefficient of range for the following:

Wages:	30-32	32-34	34-36	36-38	38-40	40-42	42-44
Labourers:	12	18	16	14	12	8	6

19. A and B play a game in which their chance of winning are in the ratio 3:2. Find A's chance of winning at least three games out of five games played.

20. Find the mean value of RVX where probability density function $f(x)=\begin{cases} x, & 0<x<1 \\ 2-x, & 1<x<2 \\ 0, & otherwise \end{cases}$.

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. Given $y'=1-y$, and $y(0)=0$, solve

(i) $y(0.1)$ by Taylor's series

(ii) $y(0.2)$ by Euler method

(iii) $y(0.3)$ by improved Euler method

(iv) $y(0.4)$ by Milne's method.

22. a) (i) Determine the real root of $x\log_{10} x - 1.2 = 0$ correct to four decimal places, using the method of false position. (7)

(ii) Apply Gauss-Seidel method to get the solution of the equations (7)
$27x + 6y - z = 85$, $6x + 15y + 2z = 72$, $x + y + 54z = 110$.

(OR)

b) Find the solution of the equations $f(x, y) = y^2 + 4x^2 + 2xy - y - 2 = 0$ and $g(x, y) = y^2 + 2x^2 + 3xy - 3 = 0$ starting with $x_0 = 0.4$ and $y_0 = 0.9$ using Newton Raphson method.

23. a) (i) The population of a town in the census is given below. Estimate the population in the year 1895. (7)

Year:	1891	1901	1911	1921	1931
Population (in 1000's):	46	66	81	93	101

(ii) From the following table find $f(x)$ and hence find $f(6)$ using Newton's interpolation formula. (7)

x:	1	2	7	8
f(x):	1	5	5	4

(OR)

b) Evaluate $\int_0^{\pi/2}\int_0^{\pi/2} \sin(x+y)\,dxdy$ by using trapezoidal rule, Simpson's rule and also by actual integration.

24. a) (i) Scores of two golfers for 24 rounds were as follows: (7)

Golfer A: 74, 75, 78, 72, 77, 79, 78, 81, 76, 72, 72, 77, 74, 70, 78, 79, 80, 81, 74, 80, 75, 71, 73, 78.

Golfer B: 86, 84, 80, 88, 89, 85, 86, 82, 82, 79, 86, 80, 82, 76, 86, 89, 87, 83, 80, 88, 86, 81, 81, 87.

Select which golfer may be considered to be a more consistent player?

(ii) Find the equation of regression lines for the following values of X and Y. (7)

X:	1	2	3	4	5
Y:	2	5	3	8	7

(OR)

b) (i) Determine the mean, median and mode for the following distribution: (7)

Wages(in Rs.):	20-30	30-40	40-50	50-60	60-70
No. of labourers:	3	5	20	10	5

(ii) The marks secured by the recruits in the selection test X and in the proficiency test Y are given below. Calculate the rank correlation co-efficient. (7)

S. No.	1	2	3	4	5	6	7	8	9
X :	10	15	12	17	18	16	24	14	12
Y :	30	42	45	46	33	34	40	35	39

25. a) (i) In a bolt factory, three machines A, B and C manufacture 50%, 30% and 20% of the product respectively. Machine A produces 4% defective bolts, Machine B produces 5% defective bolts and Machine C produces 2% defective bolts in its product. A bolt is selected at random from the product of the factory and is found to be defective. Find the probability that it is manufactured by the three machines. (7)

(ii) A random variable X has the following probability distribution. (7)

Value of X :	0	1	2	3	4	5	6	7	8
P(x) :	a	3a	5a	7a	9a	11a	13a	15a	17a

a) Determine a.

b) Find P(X < 3), P(0 < X < 5)?

(OR)

b) (i) For a binomial distribution of mean 4 and variance 2, find the probability of getting (a) at most 2 successes. (b) Find $P(5 \leq X \leq 7)$. (7)

(ii) A certain type of storage battery last on the average 3.0 years with standard deviation of 0.5 year. Assuming that the battery lives are normally distributed, find the probability that a given battery will be less than 2.3 years and more than 5 years. (7)

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