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SE-6207

B. E. II (Sem. - III) (EL) Examination

April / May – 2011

CAEE

(Computer Applications to Electrical Engineering)

Time : Hours] [Total Marks :

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (SEM. 3) (EL)**

Name of the Subject :

☛ **CAEE**

☛ Subject Code No. : **6 2 0 7** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Attempt all questions.
(3) Assume suitable data if necessary.
(4) Programmable calculators are not allowed.
(5) Students may use MS100, 100W or equivalent calculators.

1 (a) Answer the following questions : **10**

(i) Let x=0.05578, compute the absolute error if the no. is rounded off to 3 decimal digit.

(ii) For $f^n\ x+\log x-2=0$. find the interval that contains the root.

(iii) Write down formula for $(i+1)^{th}$ approximation for Newton-Raphson method.

(iv) Specify types of following eq^n :

(a) $xe^x - x\sin x = 0$

(b) $x^5+2x^4+3x^3+x^2+1=2$

(v) Let $x^2-177=0$ find the first interactive steps for the solution using N-R method.

(b) The Maclaurin's expansion for e^x is given **7**

by $e^x = 1+x+\frac{x^2}{2!}+\frac{x^3}{3!}.....+\frac{x^{n-1}}{(n-1)!}+\frac{x^n}{n!}e^{\xi}, 0<\xi<x$ find n

such that the value of e^x correct to 8 decimal places at $x=1$.

(c) Compare and contrast between Jacobi's method and Gauss-Seidel method. **3**

2 (a) In $3-\phi$ electrical power system network, the critical clearing angle $\delta_{cr} = 118.62^{o}$, $\delta_0 = 21.64^{o}$ and inertia constant $H = 2.52$ MF/MVA and $P_m = 21.56$ Mw. The critical clearing time t_{cr} is described by the eq^{n} **8**

$$t_{cr} = \left(\frac{2H\left(\delta_{cr} - \delta_0\right)}{\pi f P m} \right)^{1/2}$$

Where f = freq. 50Hz. Find t_{cr} for using "Bisection method", interval [0,1], correct upto 3-decimal places.

(b) Write down algorithm for "Secant method". **6**

OR

2 (a) Use secant method to estimate the root of the equation $xe^{x} = \cos x$ lie in the interval [0.5,1] correct to 3 decimal places. cos x is evaluated in readiness only. **7**

(b) Develop "C" programme for "false position" method. **7**

3 Attempt any **two** : **16**

(i) Write an Algorithm for "Gauss Elimination method".

(ii) Solve the following set for equations using Gauss-Jordan method and find x_1, x_2, x_3 correct to 3 decimal points

$$2x_1 - 2x_2 + 5x_3 = 13$$
$$2x_1 + 3x_2 + 4x_3 = 20$$
$$3x_1 - x_2 + 3x_3 = 10$$

(iii) Solve the following system of equations accurate to four significant digits using Gauss-Seidel method (Perform 5 interations)

$$10x_1 + x_2 + 2x_3 = 44$$
$$2x_1 + 10x_2 + x_3 = 51$$
$$x_1 - 2x_2 + 10x_3 = 61$$

4 (a) Attempt all questions : **10**

(i) Define Interpolation and Extrapolation. **2**

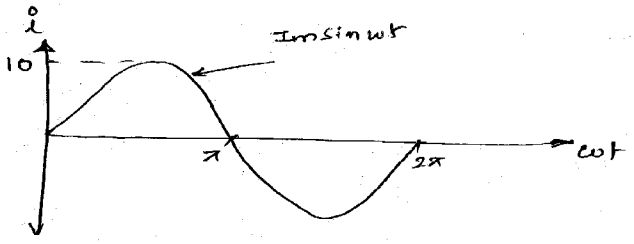
(ii) Construct a Newton's Forward Difference table for the four sets of data. **2**

(iii) $m = \frac{d^2y}{dx^2} + C\frac{dy}{dx} + ky = 0$; for this given equation, Find out what is the degree and power of this differential equation. **2**

(iv) Write the general equation or formula for **2**
(a) Eular's method
(b) Runga.Kutta 2nd order method

(v) Write the formula for the Simpson's $\frac{1}{3}rd$ Rule. **2**

(b) (i) Find the average value of the following waveform. Use trapezoidal Rule of integration. **5**



(ii) Write an algorithm for Runga-Kutta second order method for solving an ordinary differential equation. **5**

5 (a) For the given table of values as **8**

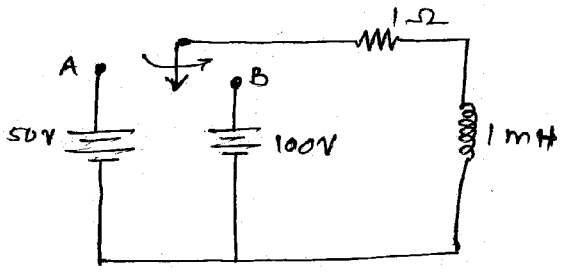
x	20	25	30	35
$y(x)$	0.342	0.423	0.500	0.650

use Langrangian Interpolation method and find x(0.390)

(b) Write a "C" program to solve numerical integration using Simpson's $\frac{1}{3}rd$ Rule. for a tabulated data. Mention the meaning of each variable used. **7**

OR

5 (a) In the circuit given below, the switch K is put in position A for a long time. At time, t=0, the switch is quickly moved to position B. Find the current through the inductor after a duration of one time constant. Use Runga.Kutta second order method.



(b) Write an algorithm of Newton's forward difference interpolation Technique. Mention the meaning of each variable. **7**

6 Attempt any **three** : **15**

(i) Given the table of values as

x	2.5	3.0	3.5	4.0	4.5
$y(x)$	9.75	12.45	15.70	19.52	23.75

Find $y(4.25)$ using Newton's Backward difference Interpolation Technique.

(ii) Solve the following ordinary differential equation using Euler's method, $\frac{dy}{dx} = xy$ with $y(1) = 5$.

Find the solution correct to three decimal position in the interval [1,1.5] using step size h=0.1.

(iii) Evaluate $\int^{2} e^{-\frac{1}{2}x} dx$ using four intervals using Simpson's $\frac{1}{3}rd$ Rule.

(iv) Write an algorithm of Simpson's $\frac{3}{8}th$ Rule to solve numerical integration, for tabulated function.