Sanjay Ghodawat University, Kolhapur 2018-19
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Year and Program:2018-19 S.Y. B. Tech | **School of Technology** | **Department : Mechanical**

Course Code: MET202 | **Course Title: Numerical Methods and Statistics.** | **Semester – IV**

Day and Date: Tuesday, 21st may2019 | **End Semester Examination (ESE)** | **Time:** 10:30Am to 1:30pm **Max Marks: 100**

Instructions:
1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Non-programmable calculator is allowed.
4) Use of z-table (Normal table) is allowed.

		Marks	Bloom's Level	CO
Q.1	**Solve the following**			
a)	Find the real positive root of the equation $x\log_{10}x=1.2$ by Bisection Method up to 6th approximation, Given that root lies in the interval $[2,3]$.	07	L1	CO1
	OR			
a)	Find the real positive root of the equation $\cos x = xe^x$ which lies in the interval $[0,1]$ using Regula-Falsi Method up to 6^{th} approximation.	07	L1	CO1
b)	Solve the following equations using Jacobi's Iterative method (up to 7^{th} approximation). $3x-6y+25z=22;\ 2x+20y-3z=19;\ 15x+2y+z=18.$	08	L3	CO2
	OR			
b)	Solve the following system of equations using Relaxation method, $10x-2y-3z=205;-2x+10y-2z=154;-2x-y+10z=120.$	08	L3	CO2
Q.2	**Solve the following**			
a)	Using Stirlings formula find y_{35} if the given values are $y_{20}=512, y_{30}=439, y_{40}=346, y_{50}=243$	07	L1	CO3
	OR			
a)	Using Newton's Divided difference method find the polynomial of	07	L1	CO3

the following data,

x	-1	0	1	3
$f(x)$	2	1	0	-1

b) A random variable x has the following probability distribution. 08 L1 CO4

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

Find *i)* k *ii)* $P(x<6)$ *iii)* $P(x\geq 6)$ *iv)* $P(3<x\leq 6)$

OR

b) Fit the Poisson Distribution for the following data, 08 L4 CO4

x	0	1	2	3	4	5
f	142	156	69	27	5	1

Q.3 **Solve any Two**

a) Round off the following numbers to 4 significant figures and compute absolute and relative errors. 08 L2 CO1

i)865250 ii)37.46235 iii) 3.26425 iv)35.46735

b) Solve the following system of equations using Gauss Jordon method 08 L3 CO2

$x+y+2z=4;\ 2x+4y+7z=13;\ 3x+5y+z=9.$

c) Find $f(0.5)$ and $f(4)$ for the following table, 08 L1 CO3

x	0	1	2	3
$f(x)$	1	2	1	10

d) A sample of 100 dry battery cells are tested to find the length of life produced the following results, $\bar{x}=12$ hours and $\sigma=3$ hours. Assuming the data to be normally distributed, analyze what percentage of battery cells are expected to have life, i) More than 15 hours, ii) less than 6 hours, iii) between 10 to 14 hours , iv) less than 12 hours. 08 L4 CO4

Q.4 **Solve any Two**

a) Calculate $f'(4)$ from the following table, 09 L3 CO5

x	1	2	4	8	10
$f(x)$	0	1	5	21	27

b) Compare the value of $\int_{0.2}^{1.4}(\sin x-\log_e x+e^x)dx$ by taking $h=0.2$ by using 1) Simpson's $1/3^{rd}$ rule 2) Simpson's $3/8^{th}$ rule. 09 L2 CO5

c)	Find $\int_0^1 \frac{1}{1+x}dx$ using Romberg's method.	09	L1	CO5
Q.5	**Solve any Two**			
a)	Using Euler's Modified Method find $y(0.1)$ if $\frac{dy}{dx} = x+3y; y(0)=1$ taking $h=0.05$.	09	L3	CO6
b)	For $\frac{dy}{dx} = 2y+3e^x; y(0)=1$ find y at $x=0.2$ by Taylor's series method in two steps.	09	L1	CO6
c)	Use Picard's method to solve the following differential equation with given conditions $\frac{dy}{dx} = 2x-y; y(0)=1$ up to 5th approximations.	09	L3	CO6
Q.6	**Solve any Three**			
a)	A rocket is launched from the ground. Its velocities were recorded as follows. Find the acceleration at $t=50$.	06	L1	CO5

t	0	10	20	30	40	50
v	0	200	600	1200	2000	3000

b)	Apply Trapezoidal rule to evaluate $\int_4^{5.2} \log_e x\, dx$ by taking $h=0.2$	06	L3	CO5
c)	Apply Runge-Kutta of 4th order find $y(0.2)$ for the differential equation $\frac{dy}{dx} = 3x+\frac{y}{2}; y(0)=1$.	06	L3	CO6
d)	Using Euler's Method, find an approximate value of y corresponding to $x=0.5$ in 5 steps for $\frac{dy}{dx} = x+y; y(0)=1$.	06	L1	CO6

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