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Total No. of Questions : 18

B.Tech. (CE) (2012 to 2017) (Sem.–6)

NUMERICAL METHODS IN CIVIL ENGINEERING

Subject Code : BTCE-604

M.Code : 71085

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer the following :

1. Define Transcendental Equation.
2. Write normal equations for fitting straight line.
3. Give any two differences between Galerkin's method and Collocation method.
4. Write formula of Modified Euler's method for the solution of ordinary differential equation.
5. Give SOR method for the solution of partial differential equation.
6. Write a short note on Initial value problems.
7. Write relation between forward operator and shift operator.
8. Write Newton-Raphson formula for the solution of Non-linear equations.
9. Define Interpolation & Extrapolation.
10. Write three different techniques for the solution of Boundary value problem.

SECTION-B

11. Using Newton's iterative method, find the real root of $x\log_{10}x = 1.2$. Correct to five decimal places.

12. Given log x for x = 40, 45, 50, 55, 60 and 65 according to the following table :

x :	40	45	50	55	60	65
Log x :	1.60206	1.65321	1.69897	1.74036	1.77815	1.81291

Find the value of log 58.

13. Using Runge-Kutta method of order 4, find $y(0.2)$ for the equation $y' = (y - x)/(y + x)$

$y(0) = 1$, take $h = 0.2$.

14. Explain New marks method for the solution for nonlinear problems.

15. Given the following experimental values :

X :	0	1	2	3
Y :	2	4	10	15

Fit by the method of least squares a parabola of the type $y = a + bx^2$.

SECTION-C

16. Solve the equation $\nabla^2 u = -10(x^2 + y^2 + 10)$ over the square with sides $x = y = 0$, $x = y = 3$ with $u = 0$ on the boundary and mesh length $(h) = 1$.

17. Solve the boundary value problem defined by $y'' - x = 0$ and $y(0) = 0$, $y(1) = -1/2$ by Galerkin's method.

18. Solve the following linear equations :

$$2x + 8y + 2z = 14$$

$$6x + 6y - z = 13$$

$$2x - y + 2z = 5$$

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.