Examination questions on the Computational Methods.

1. Integration of differential equations by means of power series.
2. Picard's method for ODE's.
3. Euler's method for the numerical solutions of IVP.
4. Heun's method for the numerical solutions of IVP.
5. Midpoint method for the numerical solutions of IVP.
6. Modified Euler method for the numerical solutions of IVP.
7. Second-order R-K method for numerical solution of Cauchy problem
8. Fourth-order R-K method for numerical solution of Cauchy problem
9. Adams' extrapolation formula for numerical solution of the IVP.
10. Adams' interpolation formula for numerical solution of the Cauchy problem.
11. Determining the coefficients a_i and b_i in the Adams' method.
12. The Stermer's method for numerical solution of the IVP.
13. Determining the coefficients a_i and b_i in the Stermer's method.
14. FDM for second order linear differential equations.
15. Replacing derivatives using finite differences.
16. The error estimation of the FDM for second order linear differential equations.
17. The TDMA for the numerical solution of BVP.
18. Finding the TDM formulas.
19. The Collocation method for numerical solution of the BVP.
20. Construction of system of equations respect to constants $c_1, c_2, \ldots, c_n$ in the collocation method.
21. Construction of the functions $\varphi_1(x), \varphi_2(x), \ldots, \varphi_n(x)$ in the collocation method.
22. Choosing the basis functions in the collocation method.
23. Galerkin's method for numerical solution of the BVP.
24. Choosing the basis functions in the Galerkin's method.
25. Construction of the functions $\varphi_1(x), \varphi_2(x), \ldots, \varphi_n(x)$ in the Galerkin's method.
26. Construction of the function $R(x, c_1, c_2, \ldots, c_n)$ in the Galerkin's method.
27. Ritz method for approximate solution of a variational problem
28. An idea of Riesz method (General theory).
29. Application of the Riesz method to the solution of linear BVP for ODE's.
30. Application of the Riesz method to the solution of linear BVP for elliptic differential equations.
31. The FDM for elliptic type equations for PDE's.
32. The FDM for hyperbolic type equations for PDE's.
33. The FDM for parabolic type equations for PDE's.
34. Difference Formulas with Cross-Derivatives.
35. Method of degenerated kernels for integral equations.
36. Numerical solution of Fredholm linear integral equation of second kind.

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