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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2020 ONLY)

20PCY413

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: JULY 2022

M.Sc.-CHEMISTRY **MAXIMUM MARKS: 70**

SEMESTER-IV **TIME : 3 HOURS**

PHYSICAL METHODS IN CHEMISTRY

SECTION - A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS. **(K1)**

1. Find out the standard deviation for the following set: (10, 12, 15, 13, 18, 16)_____.
   a) 2.45 b) 2.65 c) 2.83 d) 3.0
2. The correct order for flow chart of HPLC is_____.
   a) mobile phase (reservoir) > Injector > pump > detector > column
   b) injector > pump > column > mobile phase (reservoir) > detector
   c) mobile phase (reservoir) > pump > injector > column > detector
   d) pump > detector > mobile phase (reservoir) > injector > column
3. Which of the following information is best described about ESCA?
   a) Mass of the electron b) Charge of the electron
   c) Binding energy of the electron d) Mass of atoms
4. ESR spectroscopy uses_____ radiation.
   a) Visible b) Microwave c) Radiowave d) UV
5. Which of the following is correct about ORD?
   a) Change in optical activity with respect to wavenumber
   b) Change in wavenumber with frequency
   c) Change in optical activity with respect to wavelength
   d) Change in wavenumber with wavelength

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES **(K2)**

6. Illustrate any two assumptions of t-test.
7. Write the basic difference between DSC and DTA.
8. Write the most commonly used detector in Auger electron spectroscopy.
9. Define g-factor.
10. What is axial halo ketone rule?

SECTION – B (5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) The analysis of a city drinking water for arsenic yielded values of 5.60. 5.64, 5.70, 5.69, and 5.81 ppm. The last value appears anomalous; should it be rejected at the 95% confidence level? Explain.

(OR)

b) Compare accuracy and precision.

(CONTD…2)

12. a) Describe briefly the principle and methodology of solid phase extraction.

(OR)

b) Explain the differences between normal and reversed-phase chromatography.

13. a) Explain in detail the TGA thermogram of decomposition of $CaC_2O_4.H_2O$.

(OR)

b) Describe briefly the basic principle and applications of UV photoelectron spectroscopy.

14. a) Give an account of hyperfine splitting.

(OR)

b) Discuss the applications of Mossbauer spectroscopy.

15. a) State and explain Octant rule.

(OR)

b) Give an account of molecular phosphorescence spectroscopy and its applications.

SECTION - C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS (FROM Qn. No : 17 to 21) (K4 (Or) K5)

16. Discuss the following: **(3+3+4)**

i) Doppler shift ii) Isomer shift iii) Zero field splitting

17. Give a brief account of polynomial equation fitting.

18. Discuss in detail the principle and instrumentation of GC.

19. Outline briefly the instrumentation and applications of Atomic absorption spectroscopy.

20. i) Predict the number of ESR signals for the following: **(1.5+1.5)**

A) CH_3 radical

B) Benzene anion radical

ii) Write a note on Kramer's degeneracy and of value. **(7)**

21. i) Explain in detail the applications of CD. **(7)**

ii) Write a note on fluorescence. **(3)**

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