

Full Marks: 30

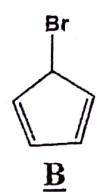
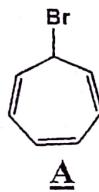
Time: 2 Hrs.

Answer all questions

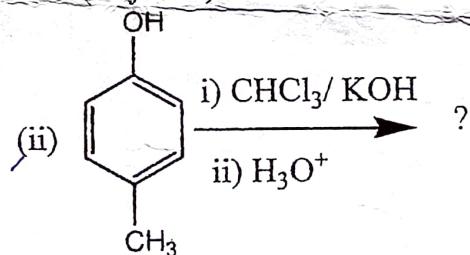
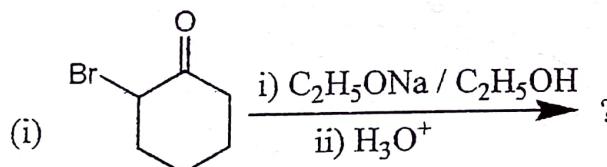
1. (a) Give explanations for the following observations: (any two)

- (i) Guanidine $[HN=C(NH_2)_2]$ is an extremely strong base
- (ii) 2, 4, 6-trinitrophenol (picric acid) behave as a strong acid
- (iii) The ethanolic solution of *p*-nitrophenol shows λ_{max} 313 nm but on addition of dilute NaOH to the solution, the λ_{max} is shifted to 400 nm.

(b) Explain why A gives immediate precipitation of AgBr on aqueous ethanolic $AgNO_3$ solution but B does not respond even in boiling condition.



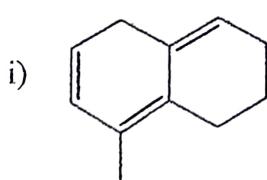
(c) Predict the product with a reasonable mechanism: (any one)



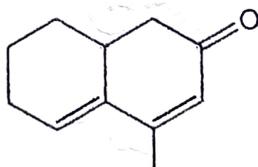
(d) State Lambert- Beer's law of absorption of light and hence prove: $A = \epsilon cl$ where A = absorbance, ϵ = molar extinction co-efficient, c = molar concentration, l = path length

OR

(e) Calculate the λ_{max} in nm each of the following compounds.



and



$[(1\frac{1}{2} \times 2) + 2 + 2 + 3]$

2. (a) Discuss, with examples, two classifications of the essential elements in biology based on their concentrations and based on their types of function.

(b) Answer any two

- (i) Give the factors which determine the essentiality.
- (ii) Write down the structure of chelating agents that are used for the removal of toxicity of any two of the following:
copper, CH_3Hg^+ and iron.
- (iii) Discuss the basic Principles of MRI technology and draw a structure of an MRI contrast agent.
- (iv) What are the essential criteria that a radioisotope must satisfy to be considered for the radiotherapeutic use? Give examples one each of radionucleotide widely used for diagnostic and therapeutic purposes.

[4+[(3×2)]]

3. (a) For the given first-order opposing reaction, $A \xrightleftharpoons[k_{-1}]{k_1} B$, determine the concentration of the reactant and product with time (considering the reactant is only present at initial condition). What do you expect for the above scheme when $k_1 \gg k_{-1}$? Justify.

(b) For the formation of phosgene (COCl_2) write down the probable steps for the reactions and obtain the rate expression for these processes.

(c) For an enzyme-substrate kinetics model, what information do you obtain from the expression of the Michaelis-Menten constant (K_M)?

[4+4+2]