KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.) 2024 Admission
III Semester Final Examination – January 2026

BES 2108   **Engineering Chemistry (2+1)**   **Marks: 50**
                                                                 Time: 2 hours

I   **State True or False**   **(10x1=10)**
1.   Stretching vibrations in IR spectroscopy involve a change in bond angle.
2.   Dropping mercury electrode is used as the working electrode in polarographic analysis.
3.   The viscosity index of a good lubricating oil should be low.
4.   Conjugated proteins consist of a protein part and a non-protein prosthetic group.
5.   In Zn–Fe bimetallic couple, the zinc gets corroded and iron gets protected.
    Fill in the blanks
6.   …………..and ………………are the stable crystalline forms of sulphur.
7.   The potential difference between the fixed layer and the mobile layer in a colloid is called……….
8.   The orange-yellow coloured natural pigment obtained from turmeric is ……………..
9.   The temperature below which a polymer is hard and brittle, and above which it becomes soft and flexible, is known as………………
10. …………….. is the highest rank coal with highest percentage of carbon.

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**
1.   What is meant by ultimate analysis of coal?
2.   What is the principle of Thermogravimetric analysis?
3.   What are radioactive traces? Give any two applications.
4.   Discuss the reduction method for the synthesis of colloids with a suitable example.
5.   How is disinfection conducted using chloramines?
6.   Differentiate between saponification value and acid value. Give the significance of both.
7.   A dye solution with 0.05 M shows an absorbance of 0.6 at 530 nm. A test solution of the same dye shows an absorbance of 0.45 under the same conditions. Calculate the concentration of the test solution.

III   **Answer ANY FIVE of the following**   **(5x4=20)**
1.   Define degrees of freedom. Calculate the degrees of freedom for a water system when
     (i)   Ice and liquid water coexist and
     (ii) Ice, liquid water, and vapour coexist.
2.   What are the differences between thick film lubricants and extreme pressure lubricants?
3.   A coal sample contains C=85%, O=8%, H= 4%, S= 1% and ash = 2% by weight. Calculate its gross and net calorific values.
4.   Define knocking and the Octane number. How are they related?
5.   Differentiate between enzymes and co-enzymes. Discuss the role of various enzymes and coenzymes in the conversion of ethanol to acetic acid by fermentation.
6.   Explain the Bergius process for the synthesis of petrol.
7.   What are polysaccharides? Write short notes on starch, dextrin and pectic substances.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**

1.   (a)   How is demineralization of hard water conducted using the ion exchange method? Explain with a neatly labelled diagram.

        (b)   Write a short note on food flavouring agents and food preservatives.

2.   (a)   Explain the mechanism of free radical polymerization with a suitable example.

        (b)   Explain the mechanism of concentration cell corrosion with a suitable example.

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