

KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Hum 1121

(Sociology and Economics)

Time: 3 Hours

Total Marks: 210

- N.B.:** i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) "Sociology is the scientific study of social behavior and human groups" – explain it. 10
- 1(b) Do you think study of sociology is important for the students of textile Engineering? 10
Give reason in favor of your opinion.
- 1(c) Sociology has a short past but long history'- explain this statement with example. 15
- 2(a) What is society? Distinguish between society and community. 10
- 2(b) What is socialization? Critically describe role of agencies/ agents of socialization. 15
- 2(c) What is social structure? Discuss basic elements of social structure. 10
- 3(a) Distinguish between subculture and counter culture. Give example from your own society. 10
- 3(b) Explain cultural lag with example. 10
- 3(c) What is culture? Explain the carries of culture. 15
- 4(a) What is Juvenile delinquency? Explain causes of Juvenile delinquency. 15
- 4(b) What is urban ecology? Critically describe urban growth models. 20

SECTION-B

- 5(a) How is economics like a science? What are the two subfields into which Economics is divided ? Explain. 15
- 5(b) Explain the idea of "Trade off" with example. Use a production possibilities frontier (PPF) to illustrate society's trade off between a clean environment and high income. Explain. 20
- 6(a) What is the law of demand? Draw a demand curve from a hypothetical demand schedule . 10
- 6(b) What are the main factors that affect the supply of any goods or services ? 15
- 6(c) What do you mean by the word "equilibrium"? In equilibrium, show producer's and consumer's surplus. 10
- 7(a) Define the idea of GDP, Nominal GDP and real GDP. List and explain the four components of GDP with example. 15

- 7(b) What are Private savings, Public savings and National savings? Explain. 10
- 7(c) What is inflation? How can you calculate the rate of inflation? Explain with example. 10
- 8(a) Draw and explain the idea of total cost, average cost and marginal cost. How are they related? 10
- 8(b) What do you mean by the word 'production' in engineering economics? Explain the different factors of production. 15
- 8(c) What is meant by a competitive firm? Under what conditions will a firm exit a market? Explain. 10

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017.

TE 1123

(Polymer Engineering)

Time: 3 Hours

Total Marks: 210

N.B.: i) Answer any THREE questions from each section in separate scripts.

ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) What is polymer? Write down the importance of polymer science. 10
- 1(b) Write down the classification of polymer on the basis of geometrical structure. 10
- 1(c) Describe the criteria of fiber forming polymer. 15
- 2(a) What is polymerization? 5
- 2(b) Discuss free radical polymerization with examples. 15
- 2(c) Differentiate between chain and step polymerization. 5
- 2(d) Show the relation between DP and extent of reaction. 10
- 3(a) What is polymer degradation ? Discuss the changes happen to polymer due to degradation? 10
- 3(b) What are the factors of polymer degradation ? 10
- 3(c) Describe the photo – degradation process of polymer. 15
- 4(a) What is T_m and T_g ? Write down the relation between T_m and T_g . 10
- 4(b) Discuss the factors that influence the glass transition temperature of polymer. 10
- 4(c) Describe in brief the graphical representation of T_g and T_m . 10
- 4(d) Write down the value of T_m and T_g of P.V.C , Nylon- 6 , Nylon 6:6, polyamide. 5

SECTION-B

- 5(a) What is functionality of monomer ? Give examples. 6
- 5(b) Classify the polymerization process. 8
- 5(c) For which purposes solution polymerization is carried out ? 7
- 5(d) Describe the technique of emulsion polymerization with necessary sketch. 14
- 6(a) What is super cool liquid and pseudo liquid? 6

- 6(b) Write down the factors that control the crystallinity of polymers. 7
- 6(c) Describe the polymer crystals with necessary sketch. 10
- 6(d) Why some polymers are highly crystalline and some are highly amorphous ? explain it . 12
- 7(a) What is number average molecular weight? Derive the following expression for number average molecular weight $M_n = \frac{\sum n_i M_i}{\sum n_i}$. 12
- 7(b) Why solid state polymerization is preferable to increase the molecular weight of polyester or nylon chips? Describe the process of solid state polymerization. 13
- 7(c) Calculate the number average molecular weight , weight average molecular weight and polydispersity index of a polymer sample comprising of 8 moles of polymer molecules having molecular weight of 50000 gm/mol and 6 moles of polymer molecules having molecular weight of 20000 gm/ mol. 10
- 8(a) Write down the functions of different zones in extruder machine with proper sketch. 12
- 8(b) Describe the exhaustion molding process of thermoplastic polymer with proper sketch. 12
- 8(c) Derive the following expression for degree of polymerization in step growth polymerization : 11
 $\langle N \rangle = 1 + K + [A]_0$

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Math 1221
(Mathematics-I)

Time: 3 Hours

Total Marks: 210

- N.B.: i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) If $f(x) = |x-1| + |x+3|$, then test the continuity of $f(x)$ at $x = -3$ and differentiability at $x = 1$. 15
- 1(b) Solve $\lim_{x \rightarrow 0} \frac{e^x - e^{\sin x}}{x - \sin x}$. 10
- 1(c) A wire of length 20 metre is bent so as to form a circular sector of maximum area. Find the radius of the circular sector. 10
- 2(a) State Leibnitz's theorem. If $y = a \sin^{-1} x + b \cos^{-1} x$ then prove that $(1-x^2)y_{n+2} - (2n+1)x y_{n+1} - n^2 y_n = 0$. 15
- 2(b) Write Maclaurine series in infinite form. Expand $5x^2 + 7x + 3$ in power of $(x-2)$. 10
- 2(c) Differentiate $x^{\sin^{-1} x}$ with respect to $\sin^{-1} x$. 10
- 3(a) If the line $lx + my = 1$ touches the curve $(ax)^n + (by)^n = 1$, then prove that $\left(\frac{l}{a}\right)^{\frac{n}{n-1}} + \left(\frac{m}{b}\right)^{\frac{n}{n-1}} = 1$. 12
- 3(b) Find radius of curvature at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ of the curve $x^3 + y^3 = 3axy$. 13
- 3(c) Find the asymptotes of the curve $4x^4 - 5x^2y^2 + y^4 + y^3 - 3x^2y + 5x - 8 = 0$. 10
- 4(a) State Rolle's theorem. Verify Rolle's theorem for $f(x) = 2 + (x-1)^{\frac{2}{3}}$ in $0 \leq x \leq 2$. 12
- 4(b) Prove that the sum of intercept of the tangent to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ upon the co-ordinate axis is constant. 11
- 4(c) If $U = x^2 \tan^{-1} \frac{y}{x} - y^2 \tan^{-1} \frac{x}{y}$ then find U_{xy} . 12

SECTION-B

5. Integrate any three of the followings : 35

(a) $\int e^{2x} \frac{1 + \sin 2x}{1 + \cos 2x} dx$

(b) $\int (3x - 2)\sqrt{x^2 + x + 1} dx$

(c) $\int \frac{x^2 + 1}{x^4 + 1} dx$

(d) $\int \frac{3 \sin x - 4 \cos x - 5}{2 + \cos x - 2 \sin x} dx$

6. Evaluate any three of the followings : 35

(a) $\int_0^1 \frac{\ln(1+x)}{1+x^2} dx$

(b) $\int_0^{\frac{\pi}{2}} \frac{1}{3 + 2 \sin x} dx$

(c) $\int_0^{\frac{\pi}{2}} \frac{dx}{2 \sin x + \cos x + 2}$

(d) $\int_0^2 \sqrt{x(2-x)} dx$

7(a) Prove that $\int_0^{\frac{\pi}{2}} \sin^m \theta \cos^n \theta d\theta = \frac{\left(\frac{m+1}{2}\right) \left(\frac{n+1}{2}\right)}{2 \left(\frac{m+n+2}{2}\right)}$ and hence evaluate $\int_0^1 x^6 \sqrt{1-x^2} dx$. 15

7(b) Obtain a reduction formula for $\int \sin^m x \cos^n x dx$. 10

7(c) Evaluate $\lim_{n \rightarrow \infty} \left[\frac{1}{n^4 + 1} + \frac{2^3}{n^4 + 2^4} + \frac{3^3}{n^4 + 3^4} + \dots + \frac{1}{2n} \right]$. 10

8(a) Solve the following system of linear equations : 10

$$2x + y - 2z = 10$$

$$3x + 2y + 2z = 1$$

$$5x + 4y + 3z = 4$$

8(b) Reduce the following matrix to conical form and then normal form and hence obtain its 13

$$\text{rank } A = \begin{bmatrix} 1 & 2 & 0 & -1 \\ 3 & 4 & 1 & 2 \\ -2 & 3 & 2 & 5 \end{bmatrix}$$

8(c) Find the inverse of the matrix A, if exists by elementary row operations where 12

$$A = \begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$$

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st term Examination, 2017

TE 1121

(Introduction to Textile Engineering)

Time: 3 Hours

Total Marks: 210

- N.B.:** i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- | | | |
|------|--|----|
| 1(a) | Mention the steps of the Textile pipeline | 10 |
| 1(b) | Define the following terms i) Bespoke system ii) Cotton count iii) Jute count iv) L/C | 10 |
| 1(c) | State the historical background of textile in Bangladesh | 15 |
| 2(a) | Differentiate between fiber and textile fiber. | 8 |
| 2(b) | Describe the cotton fiber properties according to cotton spinners. | 15 |
| 2(c) | Write the flow chart for combed yarn with mentioning its m/c, input and output products. | 12 |
| 3(a) | Mention the flow process of jute yarn. | 10 |
| 3(b) | Carding is the heart of spinning; Explain this statement. | 10 |
| 3(c) | Why degumming is necessary for silk fiber processing ? | 8 |
| 3(d) | Differentiate between woolen and worsted yarn. | 7 |
| 4(a) | Draw the flow chart of weaving process. | 8 |
| 4(b) | Differentiate between weaving and knitting. | 7 |
| 4(c) | What is sizing and warping. | 8 |
| 4(d) | Classify the fabrics. | 5 |
| 4(e) | Write short note on : i) Wales ii) Course | 7 |

SECTION-B

- 5(a) Define dyeing. Illustrate the dyeing procedure of cotton fabric with reactive dyes. 13
- 5(b) What is scouring ? Mention the objects of scouring. 10
- 5(c) Why H_2O_2 is called as universal bleaching agent ? 6
- 5(d) Make a list of some dyes name used for dyeing. 6
-
- 6(a) What are the differences between dyeing and printing ? 9
- 6(b) Classify the sewing thread. Mention the features of cotton and polyester thread. 15
- 6(c) Write the end uses of i) cords ii) ropes and iii) Belts 6
- 6(d) What is thickener ? 5
-
- 7(a) Briefly discuss about the historical development of RMG sector in Bangladesh. 14
- 7(b) What is pattern ? What are the objects of pattern making ? 9
- 7(c) Define the terms : Seam, FOB and trimmings. 12
-
- 8(a) Draw the flow chart of garment manufacturing process with different operations. 12
- 8(b) What is Quota and Category ? state Canada non-quota category system . 10
- 8(c) Make a list of different types of sewing machines. 7
- 8(d) Mention different types of samples used in garment processing. 6

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017

ME 1121

(Fundamental of Mechanical Engineering)

Time: 3 Hours

Total Marks: 210

- N.B.:** i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) State zeroth law of thermodynamics. Define Open, Closed and Iso-lated system. 10
1(b) Determine the total work done by a gas system following an expansion process as shown in Figure below: 12

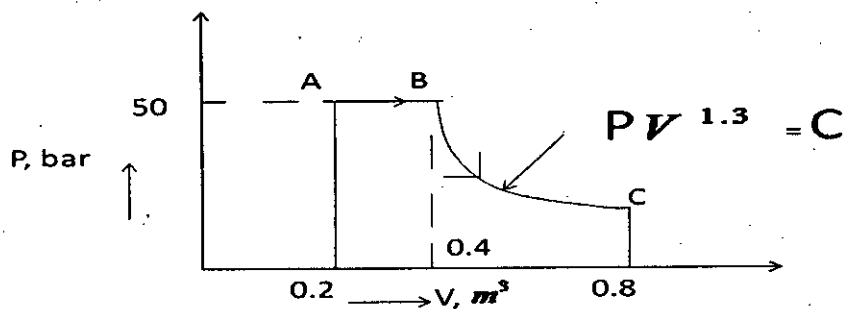


Fig- 1(b)

- 1(c) Define first law of thermodynamics when a closed system follow a cyclic process and system undergoes from one state to another state. 06
1(d) Define PMM1 and why it is impossible? 7
2(a) Prove that Internal Energy is a property of a system. 8
2(b) State and explain the 1st law of thermodynamics. Why heat and work are not completely interchangeable? 8
2(c) What are meant by reversible and irreversible process ? Explain the phenomena about the cause of irreversibility and condition for reversibility. 7
2(d) A container contains 0.75 m³ of capacity in which 8 kg of a gas at 5^o C. This container is said to be constant volume chamber and the heat is transferred to the gas until the temperature is 100^o C. Determine the workdone, heat transferred and change in internal energy. A certain gas has $C_p = 1.96 \text{ Kj /Kg K}$ and $C_v = 1.5 \text{ Kj/Kg K}$. Find its molecular mass and gas constant. 12
3(a) How does Vapour power cycle differ from Gas power cycle ? Draw the P-V and T-S diagram of (i) Brayton Cycle (ii) Dual Cycle and (iii) Diesel Cycle. 10
3(b) What is internal combustion engine? Describe the main parts of an internal combustion engine with neat sketch. 10
3(c) Describe the working principle of 4-stroke diesel engine. What are the major difference of 2-stroke and 4-stroke petrol engine? 10

- 3(d) Differentiate between petrol and diesel engine . 5
- 4(a) Explain the working principle of closed cycle gas turbine. 8
- 4(b) In a gas turbine two pressure levels are 1.5 bar and 6.5 bar respectively. Compressor 8
sucks air at ambient temp. 27°C and the compressor outlet is heated up in the
combustion chamber by 220°C . Calculate the (i) turbine work and (ii) thermal
efficiency [use $C_p = 1.12 \text{ Kj/Kg. K}$]
- 4(c) Explain the working principle of reciprocating compressor. How a compressor is 12
differentiated from a pump?
- 4(d) What is the necessity of pump to be used ? How can you classify the pump with 7
examples?

SECTION-B

- 5(a) Write down the boiler classification based on different parameters. 8
- 5(b) What is the function of fusible plug and blow of cock ? Also differentiate between boiler 8
mounting and accessories.
- 5(c) Write the basic difference of following terms. 8
(i) Between Super heater and Air-preheater and (ii) Between Lancashire and
Locomotive Boiler.
- 5(d) A coal fired Babcock and Wilcox Boiler consumes 400 Kg of coal per hour. The boiler 11
evaporates 3500 Kg of water at 43.5°C into superheated steam at a pressure of 12.75 bar
and 275.5°C . If the calorific value of fuel is 32760 Kj/Kg of coal, determine (i) the
equivalent evaporation "from and at 100°C " and (ii) the thermal efficiency of the boiler.
Assume specific heat of superheated steam as 2.1 Kj/Kg.K.
- 6(a) State the properties of a good refrigerant. 8
- 6(b) Describe the working principle of vapour compression refrigeration system with neat 14
sketch. What thermodynamic cycle does it follow?
- 6(c) A R-22 vapour compression system operating at a condenser temperature of 40°C and an 13
evaporator temperature -5°C develops 17 tons of refrigeration using the properties of
following table, draw the Ph diagram and determine (i) mass flow rate (ii) COP (iii) Power
consumption of compressor.

Specific Volume (m^3 / Kg)	v_2	0.065
Enthalpy(Kj/Kg)	h_1	185.5
	h_2	208.45
	$h_3 = h_4$	74.8

- 7(a) What are meant by air conditioning system and human comfort ? Write the factors that affect comfort air conditioning. 7
- 7(b) Classify air –conditioning system. 5
- 7(c) Explain working principle of summer air conditioning system with sketch. 9
- 7(d) What are the basic process used in conditioning of air ? 4
- 7(e) What is pool boiling ? Sketch and explain the boiling regimes in pool boiling of water at atmospheric pressure and saturation temperature. 10
- 8(a) What are the modes of heat transfer ? Explain the phenomena of heat transferred from one end of a heated up GI pipe with the other end touching by an observer and placing in the environment. 6
- 8(b) What is critical thickness of insulation ? Derive an expression for the quantity of heat flow through a composite body . 10
- 8(c) Explain the basic laws of radiation. How does film wise condensation differ from drop wise condensation? 8
- 8(d) Explain the concept of black body with its characteristics in content to radiation heat transfer. A hole of area $dA = 4 \text{ cm}^2$ is opened on the surface of a large spherical cavity whose inside is maintained at $T = 1000\text{K}$. Calculate the radiation energy streaming through the hole in all directions into space. 11

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Hum 1121
(Economics)

Time: 3 Hours

Total Marks: 210

N.B.: i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) Explain the idea of Economics, Microeconomics and Macroeconomics. 15
- 1(b) Draw and explain a production possibilities frontier for an economy that produces milk and cookies. What happens to this frontier if disease kills half of the economy's cow populations? 20
- 2(a) Distinguish between want and demand. 5
- 2(b) What is demand schedule? Explain the main determinants of demand curve to change. 20
- 2(c) What are the factors that affect the supply curve to shift? 10
- 3(a) Explain the following concepts : 10
i) Total cost = Fixed cost + Variable cost
ii) Average cost iii) Marginal cost.
- 3(b) Draw and explain the marginal-cost and average-total-cost curve for a typical firm. 25
Explain how the competitive firm chooses the level of output that maximizes profit.
- 4(a) Explain with example of various types of price elasticity of demand. 15
- 4(b) Define the price elasticity of demand. Explain the relationship between total revenue and price elasticity of demand. 20

SECTION-B

- 5(a) Explain GDP, Real GDP and Nominal GDP. List and describe the components of GDP. 15
- 5(b) In 2007, the economy produced 1000 loaves of bread that was sold for 20 tk each, in year 2008 the economy produced 2000 loaves of bread that was sold for 30 tk each. Now calculate Nominal GDP, Real GDP and GDP growth (use 2007 as base year). 20
- 6(a) Define Inflation, Demand-pull and Cost-push inflation. 15
- 6(b) To reduce the impact of inflation, how monetary policy work? 20
- 7(a) Describe consumption function and savings function. How these variables are related? 15

- 7(b) Describe a change in the tax code that might increase private savings. If this policy were implemented, how would it affect the market for loanable funds? 20
- 8(a) Define Total Product, Average Product and Marginal Product. 10
- 8(b) What is production? Explain the three stages of production. 25

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KHULNA UNIVERSITY OF ENGINEERING & TECHNOLOGY

Department of Textile Engineering

B. Sc. Engineering 1st Year 1st Term Examination, 2017

Ch 1121

(Chemistry - I)

Time: 3 Hours

Total Marks: 210

N.B.: i) Answer any THREE questions from each section in separate scripts.
ii) Figures in the right margin indicate full marks.

SECTION-A

- 1(a) Define primary and secondary reactions with examples. 8
- 1(b) What is meant by law of photochemical equivalence? Explain the term quantum yield in a photochemical reaction. 12
- 1(c) 6.02×10^{23} Moles products are found from a reaction where 10^{23} moles photons are absorbed. Calculate the quantum yield and the energy associated in the reaction. 8
- 1(d) Explain photosensitized reaction with relevant example. 7
- 2(a) How does molecular orbital theory differ from valence bond theory? Explain with suitable example. 12
- 2(b) Ice is lighter than water. Explain chemically. 8
- 2(c) Predict about bond order and magnetic nature of O_2 and N_2 molecules. 10
- 2(d) Copper shows high conductance. Explain. 5
- 3(a) Define acid – base indicator giving examples. 8
- 3(b) Discuss the Ostwald's theory of acid-base indicator. 10
- 3(c) 100 ml HCl and 100 ml H_2SO_4 can be neutralized by 100 ml NaOH (0.1M) separately. Calculate the pH of the acids. 10
- 3(d) Outline the action mechanism of a basic buffer. 7
- 4(a) What is electrical double layer? How do the colloidal particles acquire electrical charge? 12
- 4(b) What is electrophoresis? How does this phenomenon provide information that colloid particles are electrically charged? 10
- 4(c) What is sol? Explain (i) Dialysis & (ii) electrodialysis for the purification of sol. 8
- 4(d) Define gold number giving examples. 5

SECTION-B

- 5(a) Define electrolytic cell and electrochemical cell with examples. 5
- 5(b) What is glass electrode? How can it be used in measuring pH of a solution? 10
- 5(c) Deduce a relation between EMF and free energy. 10

- 5(d) Calculate the e.m.f of the cell at 25°C : 10
 $\text{Zn(s)}/\text{Zn}^{2+} (\text{c} = 4 \times 10^{-4} \text{ M}) \parallel \text{Cd}^{2+} (\text{c} = 0.20 \text{ M})/\text{Cd(s)}$
 And also (a) write the cell reaction
 (b) calculate ΔG for the reaction
- 6(a) Define corrosion and erosion with examples. 5
- 6(b) Write down the anode and cathode reaction of under-water corrosion. Discuss the effects of pH on the rate of under-water corrosion. 10
- 6(c) What is threshold value ? Describe the effect of different factors on atmospheric corrosion with the help of a diagram. 11
- 6(d) Define the following terms with examples: 9
 i) Hydrolysis ii) Electrolysis iii) Pyrolysis
- 7(a) What do you mean by colligative properties ? Explain. 8
- 7(b) What is osmosis and osmotic pressure ? State and explain the Vant Hoff's laws of osmotic pressure. 10
- 7(c) Log of a substance is dissolved in 100 g of water at 25°C . The vapour pressure of water is lowered from 17.5 mm to 17.2 mm. Calculate the molecular means of the solute. 8
- 7(d) "The elevation of boiling point is directly proportional to the lowering of vapour pressure"- explain this statement with the help of diagram. 9
- 8(a) State EAN rule. Calculate the EAN of the following complexes : 9
 (i) $[\text{Ag}(\text{NH}_3)_4]^+$
 (ii) $[\text{Co}(\text{CN})_6]^{4-}$
 Here atomic number of Ag and Co are 47 and 27 respectively.
- 8(b) Write down the IUPAC name of the following complexes : 6
 i) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ (ii) $\text{K}_4[\text{Fe}(\text{CN})_6]$
- 8(c) Explain the magnetic behavior and hybridization state of $[\text{Co}(\text{F}_6)]^{3-}$ complex. 12
- 8(d) Explain the colour of transition metal complexes according to crystal field theory. 8

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