

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Show that time and length for a moving body are no longer constant from relativistic point of view. (12)
- (b) Define relativistic mass and derive the expression for mass-energy relation from this. (15)
- (c) What is the speed of a particle if its kinetic energy is 1% larger than its rest energy? (8)

2. (a) How do X-rays lose energy when they pass through matter? Find the expression for wavelength shift of the X-rays in this process. (18)
- (b) Define Compton wavelength for an electron. (4)
- (c) Explain uncertainty principle. (5)
- (d) Find the energy of an X-ray photon, which can impart a maximum energy of 50 keV to an electron. (8)

3. (a) What are the modes of radioactive decays? Give example of each of them. (5)
- (b) Mention properties of four radioactive decay series. (8)
- (c) State radioactive decay law and hence derive the half life, $T_{1/2}$ of a radioactive substance. (10)
- (d) Explain the three situations for nuclear fission reactions. (6)
- (e) Half life of ^{24}Na is 15 h. How long does it take for 80% of a substance of ^{24}Na nuclide to decay? (6)

4. (a) Distinguish between intrinsic and extrinsic semiconductors. Write expressions for conductivities for intrinsic and extrinsic semiconductors. (11)
- (b) Draw a typical unit cell of NaCl crystal. Show that for NaCl crystal the lattice energy is given by (20)
$$V = -\frac{\alpha e^2}{4\pi \epsilon_0 r_0} \left(1 - \frac{1}{n}\right),$$

where the symbols have their usual meanings.

- (c) The covalent bond energy of C-C is 370×10^3 J/mole. What wavelength of light is required to break C-C bond? (4)

Contd P/2

PHY 117 (IPE)

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) What is crystallography? Briefly explain classification of solids from the crystallographic point of view. (7)

(b) What are the lattice parameters of a 3D unit cell? What are Bravais lattices? What is crystal system? Mention all 3D Bravais lattices with their crystal system and lattice parameters. (20)

(c) Unit cell edge length of gold crystal is 0.4080 nm. How many unit cells are in a gold foil of length 2 cm, breadth 2 cm and thickness 0.02 mm? Draw a typical unit cell of gold crystal. How many atoms are in this foil? (8)

6. (a) Explain space lattice and basis of a crystal. (6)

(b) What are the Miller indices? Discuss the method of obtaining Miller indices. Show that the Miller indices and interplaner distance are related for a cubic crystal system by (18)

$$\frac{1}{d^2} = \frac{1}{a^2} (h^2 + k^2 + \ell^2),$$

where the symbols have their usual meanings.

(c) What is crystalline nature of copper? Sketch (100) plane of a copper crystal. Atomic radius of nickel is 0.1248 nm. (i) What is the area of this plane? (ii) Calculate number of atoms/mm² of (100) plane of a copper crystal. (iii) Calculate packing factor for this crystal. (11)

7. (a) Define capacitance of a capacitor. Explain the term dielectrics with some examples of them. (6)

(b) Show that insertion of a dielectric material between the plates of a parallel plate capacitor increases the capacitance of that capacitor. Deduce Gauss's law of electricity for dielectrics having dielectric constant k. (15)

(c) A cylindrical capacitor consists of two concentric conducting cylinders having length L of each and of radii a and b (b>a). Consider inner cylinder is positively charged whereas the outer one is negatively charged. Calculate the capacitance of this device. (14)

8. (a) Write down the four Maxwell's equation of electromagnetism. Explain the physical significance of them. (12)

(b) A cylindrical conducting wire of radius R carries current I distributed uniformly across the cross-section. Using Ampere's law calculate the magnetic field \vec{B} at a distance r from the center of the wire for the following cases: (16)

- (i) Outside ($r > R$)
- (ii) Inside ($r < R$)
- (iii) Surface ($r = R$) of the wire

Also draw schematically $\vec{B}(r)$ as function of distance r.

(c) What is magnetosphere? Mention briefly its importance. (7)

SECTION – A

There are **FOUR** questions in this section. Answer any **THREE**.

1. (a) What are colligative properties? Explain why the boiling point of a solution of non-volatile non-electrolyte solute is lower than that of the pure solvent. (9)
- (b) Derive a relation between the elevation of boiling point of the solution and the molar mass of the solute. (16)
- (c) A solution of 12.5 g of urea in 170 g of water gave boiling point elevation of 0.63 K. Calculate the molar mass of urea. Given that $K_b = 0.52 \text{ K kg mol}^{-1}$. (10)

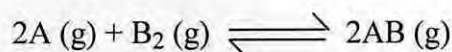
2. (a) Define the following terms: (i) phase, (ii) component, and (iii) degree of freedom. (9)
- (b) Derive the phase rule. Calculate the number of phases, components and the degree of freedom of the following systems in equilibrium: (16)
 - (i) $\text{NH}_3 (\text{g}) + \text{HCl} (\text{g}) \rightleftharpoons \text{NH}_4\text{Cl} (\text{s})$
 - (ii) $\text{CaCO}_3 (\text{g}) \rightleftharpoons \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$
 - (iii) $\text{N}_2 \text{O}_4 (\text{g}) \rightleftharpoons 2 \text{NO}_2 (\text{g})$
- (c) Show the phase diagram of water system indicating different phases and the degree of freedom in the diagram. (10)

3. (a) What is heat of reaction? Derive an expression for the variation of heat of reaction with temperature. (13)
- (b) What is basic principle of solvent extraction? Deduce an expression relating the amount of the unextracted solute in a solvent extraction process with the number of extractions. (12)
- (c) The solubility of methylamine at 18°C in water is 8.49 times greater than that in chloroform. What percentage of the substance remains unextracted in 1000 mL of chloroform solution of methylamine if it is extracted (a) four times with 200 mL of water each time and (b) twice with 400 mL of water each time? (10)

4. (a) Discuss the effect of temperature and pressure on the contact process for the production of SO_3 . (8)
- (b) Derive an equation of pH for the hydrolysis of a salt formed by a weak acid and a strong base. (10)
- (c) Explain why phenolphthalein is a suitable indicator in the titration of acetic acid by NaOH. (7)

CHEM 119 (IPE)**Contd ... Q. No. 4**

(d) A gaseous substance AB is formed at high temperature according to the following equation: (10)



5.0×10^{-2} mol of A and 3.0×10^{-2} mol of B_2 were placed in a 1.0 dm^3 closed container and heated at 230°C . At equilibrium, the concentration of AB was found to $2.0 \times 10^{-2} \text{ mol dm}^{-3}$. Calculate the equilibrium constant. If the value of the equilibrium constant at 350°C is $15.3 \text{ dm}^3 \text{ mol}^{-1}$, explain whether the reaction is exo-thermic or endothermic.

SECTION – B

There are **FOUR** questions in this section. Answer any **THREE**.

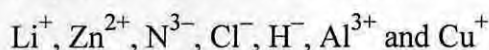
5. (a) Derive the Rydberg equation on the basis of Bohr's theory. (12)

(b) Define wave function. Find the energy equation of a particle in one dimensional box with the help of Schrodinger's wave equation and show that energy is quantized. (2+10+3=15)

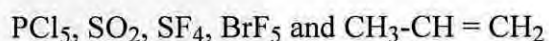
(c) Draw the radial probability distribution curves and show the nodal point of the following orbitals: 2S, 2P, 3S, 3P. (4×2=8)

6. (a) Define screening constant and effective nuclear charge. (6)

(b) What is wrong with the statement "The atoms of element A are isoelectronic with atoms of element B"? Correct the statement with proper explanation and identify the isoelectronic species from the following list: (12)



(c) Describe VSEPR model. Predict the geometry of the following molecules or ion according to VSEPR model. (5+12=17)



7. (a) NH_4^+ , H_3O^+ and NH_2^- , all three ions have SP^3 hybridization but the shapes are different from one another, why? (6)

(b) Which of the following species has a longer bond length and which species has paramagnetic properties? Explain with the help of MOT: F_2 , F_2^+ or F_2^- . (12)

(c) Define different types of electrodes with suitable examples. Write their half-cell reactions. (6)

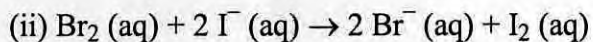
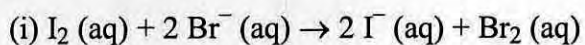
(d) What is salt bridge? Explain why a saturated solution of KNO_3 is the best for using in the salt bridge. (5)

Contd P/3

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Contd ... Q. No. 7

(e) Two reactions are given below: (6)



Which of the above reaction is spontaneous and why? Given that the reduction potentials for $Br_2/2Br^-$ and $I_2/2I^-$ are + 1.09 and + 0.54 V respectively.

8. (a) Differentiate between order and molecularity of a reaction. (8)

(b) If a reaction is $A + 2B \rightarrow 3P$, define the rate of disappearance of A and B and the rate of formation of P. What will be rate of the reaction? Find out a relation between K_a , K_b and K_c , where K have their usual meaning. (3+3=6)

(c) Discuss the principle for determination of order of the reaction given in 8(b). (13)

(d) Discuss the effect of temperature on the rate of exothermic reaction. (8)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Sc. Engineering Examinations 2014-2015

Sub : **MATH 191** (Differential and Integral Calculus)

Full Marks : 280

Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – AThere are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Test the continuity and differentiability of $f(x) = |x| + |x + 1|$ at the points $x = 0$ and $x = -1$. Also sketch the graph of $f(x)$. (16 $\frac{2}{3}$)
- (b) Find the n^{th} derivative of the function $y = e^{ax} \sin(bx + c)$. (15)
- (c) Verify Mean Value Theorem for the function $f(x) = (x - 1)(x - 2)(x - 3)$ in the interval $(0, 4)$. (15)
2. (a) Evaluate the following:
- (i) $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x}{2} \right)^{1/x}$ (15)
- (ii) $\lim_{x \rightarrow 0} \left(\frac{1}{\sin^2 x} - \frac{1}{x^2} \right)$ (15)
- (b) Find the infinite series of $\ln(\sec x)$ in powers of x . (16 $\frac{2}{3}$)
3. (a) If $u = \sin^{-1} \left(\frac{x^2 + y^2 + z^2}{x + y + z} \right)$, find the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$. (10)
- (b) Find the dimensions of the least expensive rectangular box which is three times as long as its width and which holds 100 cubic centimeters of water. The material for the bottom costs 7 cents per cm^2 , the sides costs 5 cents per cm^2 and the top costs 2 cents per cm^2 . (20)
- (c) Find the centre of curvature and the evolute of the curve $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. (16 $\frac{2}{3}$)
4. (a) Find the condition that the curves $x^{2/3} + y^{2/3} = c^{2/3}$ and $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ may touch. (26 $\frac{2}{3}$)
- (b) Find the asymptotes of the curve $x^3 + 2x^2y - 9xy^2 - 18y^3 - 4x + 8y - 1 = 0$. (20)

MATH 191/IPE**SECTION – B**

There are **FOUR** questions in this section. Answer any **THREE**.

Symbols used have their usual meaning.

5. Work out the following

$$(a) \int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}} dx \quad (15)$$

$$(b) \int \frac{dx}{(x-1)\sqrt{x^2 + 2x + 2}} \quad (15)$$

$$(c) \int \frac{dx}{1 + \sin x + \cos x} \quad (16\frac{2}{3})$$

$$6. (a) \text{ Evaluate: } \int_0^{16} \frac{\sqrt[4]{x}}{1 + \sqrt{x}} dx \quad (10\frac{2}{3})$$

$$(b) \text{ Evaluate: } \int_0^{\pi} \log(1 + \cos x) dx \quad (18)$$

$$(c) \text{ Obtain a reduction formula for } I_n = \int \frac{dx}{(a^2 + x^2)^n} \text{ and hence find } \int \frac{dx}{(1 + x^2)^3}. \quad (18)$$

$$7. (a) \text{ Evaluate: } \int_{-\infty}^{\infty} \frac{dx}{e^x + e^{-x}}. \quad (10\frac{2}{3})$$

$$(b) \text{ Show that } \frac{B(m, n+1)}{n} = \frac{B(m+1, n)}{m} = \frac{B(m, n)}{m+n}. \quad (18)$$

$$(c) \text{ Find the area bounded by the hyperbola } \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, \text{ the x-axis and an ordinate.} \quad (18)$$

$$8. (a) \text{ Find the area inside the circle } r = \sin \theta \text{ and outside the cardioid } r = 1 - \cos \theta. \quad (10\frac{2}{3})$$

$$(b) \text{ Determine the perimeter of the cusped hypocycloid } \left(\frac{x}{a}\right)^{\frac{2}{3}} + \left(\frac{y}{b}\right)^{\frac{2}{3}} = 1. \quad (18)$$

$$(c) \text{ Find the volume and surface area of the solid formed by the revolution of the area enclosed by x-axis, } y = 2x - x^2 \text{ about the x-axis.} \quad (18)$$

Sub : **IPE 105** (Principles of Cost and Management Accounting)

Full Marks: 210

Time: 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION-AThere are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Superior Door Company sells doors to home builders. Information of revenue and costs are as follows: (22)

Selling price per unit	\$100.00
Variable costs per unit:	
Direct materials	\$30.00
Direct manufacturing labor	\$12.00
Manufacturing overhead	\$8.00
Selling commissions	10%
Fixed costs:	
Fixed manufacturing costs	\$1,250
Fixed selling and administrative costs	\$2,500

Required:

- What is the contribution margin per door?
- What is the Superior Door Company's total profit when 200 doors are sold?
- What is the breakeven point in doors and sales dollar?
- How many doors must be sold to earn a targeted profit of \$7,500? What is the total sales dollar?

- (b) Data for Hermann Corporation are shown below: (13)

	Per unit	Percent of Sales
Selling price	\$90	100%
Variable expenses	<u>63</u>	<u>70</u>
Contribution margin	<u>\$27</u>	<u>30%</u>

Fixed expenses are \$30,000 per month and the company is selling 2,000 unit per month.

Required:

- The marketing manager argues that a \$5,000 increase in the monthly advertising budget would increase monthly sales by \$9,000. Should the advertising budget be increased?
- Refer to the original data. Management is considering using higher-quality components that would increase the variable cost by \$2 per unit. The marketing manager believes the higher-quality product would increase sales by 10% per month. Should the higher-quality components be used?

IPE 105

2. (a) What are the cause of difference in net operating income under variable and absorption costing? (5)

(b) Fine Producers Inc. Suffered a loss for the first month of operations. Following is the income statement prepared by the accounting service providers of Fine Producers: (30)

Sales		\$400,000
Less variable cost of goods sold		<u>\$160,000</u>
Gross contribution margin		\$240,000
Less variable selling and administrative expenses		<u>\$60,000</u>
Contribution margin		\$180,000
Less fixed expenses:		
Fixed manufacturing overhead	\$150,000	
Fixed selling and administrative expenses	<u>\$40,000</u>	<u>\$190,000</u>
Net operating loss		<u>(10,000)</u>

The loss created a serious problem because company was planning to use the statement to encourage investors to purchase the stock of the company. Other relevant data is given below:

Units produced during the first month of operation	50,000
Units sold during the first month of operation	40,000
Variable unit cost:	
Direct materials	\$2.00
Direct labor	1.60
Variable manufacturing overhead expenses	0.40
Variable selling and administrative expenses	1.50

Required:

- i. What costing method was used by the accounting service provides to prepare income statement of Fine Producers Inc? Can an absorption costing income statement show a profit rather than loss? Support our answer with computations.
- ii. Prepare company's income statement using variable costing and absorption costing for the second month if 60,000 units were sold in the second month and there were no closing inventories.
- iii. Reconcile the second month's net operating income under both the costing approaches.

3. (a) Briefly describe the differences between activity based costing and traditional costing system (5)

(b) Advanced products Corporation has supplied the following data from its activity-based costing system: (30)

IPE 105

Overhead Costs		
Wages and salaries		\$300,000
Other overhead costs		100,000
Total overhead costs		\$400,000

Activity Cost Pool	Activity Measure	Total Activity for the Year
Supporting direct labor	Number of direct labor-hours	20,000 DLHs
Order processing	Number of customer orders	400 orders
Customer support	Number of customers	200 customers
Other	This is an organization-sustaining activity	Not applicable

Distribution of resources consumption across activities:

	Supporting direct labor	Order processing	Customer support	Other	Total
Wages and salaries	40%	30%	20%	10%	100%
Other overhead costs	30%	10%	20%	40%	100%

During the year, Advanced Products completed one order for a new customer, Shenzhen Enterprises. The customer did not order any other products during the year.

Data concerning that order follow:

Data concerning the Shenzhen Enterprises Order	
Units ordered	10 units
Direct labor-hours	2 DLHs per unit
Selling price	\$300 per unit
Direct materials	\$180 per unit
Direct labor	\$50 per unit

Required:

- i. Prepare a report showing the first stage allocations of overhead costs to the activity cost pools.
- ii. Compute the activity rates for the activity cost pools.
- iii. Prepare a report showing the overhead costs for the order from Shenzhen enterprises excluding customer support costs.
- iv. Prepare a report showing the product margin for the order and customer margin for Shenzhen Enterprises.

IPE 105

4. (a) Climate control, Inc., manufactures a variety of heating and air conditioning units. The company is currently manufacturing all of its own components parts. An outside supplier has offered to sell a thermostat to climate control for \$20 per unit. To evaluate this offer, Climate control, Inc., has gathered the following information relating to its own cost of producing the thermostat internally: (10)

	Per <u>unit</u>	15,000 units <u>per year</u>
Direct materials	\$ 6	\$90,000
Direct labor	8	120,000
Variable manufacturing overhead	1	15,000
Fixed manufacturing overhead, traceable	5*	75,000
Fixed manufacturing overhead, common but allocated	<u>10</u>	<u>150,000</u>
Total cost	<u>\$ 30</u>	<u>\$ 450,000</u>

*40% supervisory salaries, 60% depreciation of special equipment (no resale value).

Required:

Assuming that the company has no alternative use for the facilities now being used to produce the thermostat, should the outside supplier's offer be accepted. Show all computations

- (b) The production department of Hareston Company has submitted the following forecast of units to be produced by quarter for the upcoming fiscal year: (25)

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Units to be produced ...	7,000	8,000	6,000	5,000

In addition, the beginning raw materials inventory for the first quarter is budgeted to be 1,400 pounds and the beginning accounts payable for the first quarter is budgeted to be \$2,940.

Each unit required 2 pounds of raw material that costs \$1.40 per pound. Management desires to end each quarter with an inventory of raw materials equal to 10% of the following quarter's production needs. The desired ending inventory for the fourth quarter is 1,500 pounds. Management plans to pay for 80% of raw materials purchases in the quarter acquired and 20% in the following quarter. Each unit requires 0.60 direct labor-hours and direct labor-hour workers are paid \$14.00 per hour.

Required:

- i. Prepare the company's direct materials budget and schedule of expected cash disbursements for purchases of materials for the upcoming fiscal year.
- ii. Prepare the company's direct labor budget for the upcoming fiscal year, assuming that the direct labor workforce is adjusted each quarter to match the number of hours required to produce the forecasted number of units produced.

IPE 105

SECTION-B

There are **FOUR** questions in this section. Answer any **THREE**.

5. (a) The following cost and inventory data is taken from the accounting records of a company for the year just completed: (15)

<u>Costs incurred</u>	
Direct Labor costs	&70,000
Purchases of Raw Material	118,000
Indirect Labor	30,000
Maintenance Factory	6,000
Advertising expense	90,000
Insurance, Factory	800
Sales salaries	50,000
Rent, Factory	20,000
Supplies	4,200
Depreciation, Office	3,000
Depreciation, Factory	19,000

<u>Inventories</u>	<u>Beginning of the year</u>	<u>End of the year</u>
Raw Material	\$7,000	\$ 15,000
Work-in-process	10,000	5,000
Finished Goods	20,000	35,000

Prepare a schedule of

- i) Cost of goods manufactured
- ii) Cost of goods sold

- (b) Various cost and sales data for XYZ company for the just completed year is given below: (20)

Finished goods inventory (beginning)	\$ 20,000
Finished goods inventory (ending)	40,000
Depreciation, Factory	27,000
Administrative expenses	110,000
Utilities, Factory	8,000
Maintenance, Factory	40,000
Supplies, Factory	11,000
Insurance, Factory	4,000
Purchases of Raw Materials	125,000
Raw Materials inventory (beginning)	9,000
Raw Materials inventory (ending)	6,000
Direct Labor	70,000
Indirect Labor	15,000
Work-in-process inventory (beginning)	17,000
Work-in-process inventory (ending)	30,000
Sales	500,000
Selling expenses	80,000

Prepare an income statement for the completed year of XYZ company.

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Units accommodated for:

Transferred to next department	190,000
Work-in-process, April 30 (75% material, 60% conversion cost-added this month)	40,000
Total units	230,000

Total Cost:

Cost to be accommodated for:

Work-in-process, April 1	\$ 98,000
Cost added during the month	827,000
Total cost	\$ 925,000

Cost Reconciliation

Cost accommodated for as follows

Transferred to the next department	\$ 805,600
Work-in-process, April 30	119,400
Total cost	\$ 925,000

- i) What are the equivalent units for the month?
 - ii) What are the costs per equivalent unit for the month?
- The beginning inventory consisted of the following costs:

Materials	\$ 67,800
Conversion	30,200
Cost added during the month:	
Materials	\$ 579,000
Conversion	248,000

iii) How many of the units transferred to the next department were started and completed during the month?

8. (a) Zerbel company, a whole seller of large, custom-built air conditioning units for commercial buildings, has noticed considerable fluctuation in its shipping expense from month to month, as shown below:

<u>Month</u>	<u>Units shipped</u>	<u>Total shipping expense</u>
Jan	4	\$ 18,000
Feb	5	21,000
Mar	6	24,000
Apr	10	33,000
May	12	35,000
Jun	11	33,000
Jul	9	30,000
Aug	8	27,000
Sep	7	26,000

(23)

IPE 105

6. (a) A company handles all aspects of recording from editing to making a digital master from which CDs can be copied. The studio has been loosing customers to newer studios equipped with more upto date equipment that are able to offer very attractive prices and excellent service. Summary data concerning the last two years of operations follow: (35)

<u>Inventories</u>	<u>1998</u>	<u>1999</u>
Estimated hours of studio service	1000	800
Estimated studio overhead cost	\$ 160,000	\$ 160000
Actual hours of studio service provided	750	500
Actual studio overhead cost incurred	\$ 160,000	\$ 160000
Hours of studio service a capacity	1,600	1,600

The company applies studio overhead to recording jobs on the basis of the hours of studio service provided. For example, 40 hours of studio time were required to record, edit ad master one particular music CD for a local band. All of the studio overhead is fixed, and the actual overhead cost incurred was exactly as estimated at the beginning of the year in both 1998 and 1999.

- i) The company computes the predetermined overhead rate at the beginning of each year. How much overhead would have been applied to that particular music CD if it had been done in 1998 and in 1999? By how much would overhead have been under-or over-applied in 1998 and in 1999?
- ii) If the predetermined overhead rate is computed at the beginning of each year based on the estimated studio overhead for the year, and the hours of the studio service that could be provided at capacity, how much overhead would have been applied using this method to that particular music CD if it had been done in 1998 and 1999? By how much would overhead have been under-or over-applied in 1998 and 1999 using this method?
- iii) How would you interpret the under or over-applied overhead that results from using studio hours at capacity to compute the predetermined overhead rate?
7. A pharmaceutical company makes a unique syrup using cane, sugar and local herbs. The syrup is sold at \$12. The first stage in the production process is carried out in the Mixing department, which removes foreign material from the raw materials and mixes them in the proper proportions in large vats. The company uses the weighted average method in its process costing system. Report prepared for the mixing department for April 2015 is as below: (35)

Quantity schedule	
Units to be accounted for:	
Work-in-process, April 1	30,000
(90% material, 80% conversion cost-added last month)	
Started into production	200,000
Total units	230,000

IPE 105

Required

- i) Using the high-low method, estimate the cost formula for shipping expense.
 - ii) Using the least-square regression method, estimate the cost formula for shipping expense.
 - iii) Estimate the total cost from both equations if 14 air conditioning units is shipped.
- (b) P & G company produces large size bags for the use of tourists; Company uses standard costing system to control costs. The standards for materials and labor costs to manufacture 1 bag are as follows: (12)

Direct Materials : 7.2 lbs @ \$5 per lb = \$ 36

Direct labor : 0.4 hrs @ \$ 20 per hr = \$ 8

During last month, P & G produced 2,500 large bags, 20,000 lbs of direct materials were purchased @ \$ 4.8 per lb. There was no direct materials inventory at the beginning and end of the month. 900 direct labor hours were recorded @ \$ 24 per hour.

Required

- i) Compute direct materials price and quantity variance
 - ii) Compute direct labor rate and efficiency variance.
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BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-1/T-1 B. Sc. Engineering Examinations 2014-2015

Sub : **HUM 211** (Sociology)

Full Marks : 140

Time : 3 Hours

The figures in the margin indicate full marks.

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – AThere are **FOUR** questions in this section. Answer any **THREE**.

1. (a) Respond to the following quote, 'Globalization, as defined by rich people like us, is a very nice thing ... you are talking about the internet, you are talking about cell phones, you are talking about computers. This doesn't affect two-thirds of the people of the world' (Jimmy Carter). (13 $\frac{1}{3}$)
- (b) Why did the Industrial Revolution take place in eighteenth-century Britain and not elsewhere in Europe or Asia? (10)
2. (a) Describe the elements of demography by citing examples from your own society. (13 $\frac{1}{3}$)
- (b) What are the most likely causes of rural-urban migration in Bangladesh? (10)
3. (a) Differentiate between 'urban ecology' and 'new urban sociology' as sociological approaches to urbanization. (13 $\frac{1}{3}$)
- (b) Elaborate the sustainable ways to reduce environmental pollution in Bangladesh. (10)
4. Write short notes on any **THREE** of the following: (23 $\frac{1}{3}$)
 - (a) Land reform in Bengal
 - (b) Migration in 1947
 - (c) Proposition of 'Malthusian Theory'
 - (d) Top ten megalopolises in the world.

SECTION – BThere are **FOUR** questions in this section. Answer any **THREE**.

5. (a) What is verstehen? Explain Max Weber's contribution in the field of sociology. (10)
- (b) Discuss functionalist theoretical perspective of sociology. (13 $\frac{1}{3}$)

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6. (a) What is social stratification? Illustrate social construction of gender differences. (10)
(b) Explain the feminist viewpoint of gender stratification. (13 1/3)
7. (a) What is 'rites of passage'? How does it work in socialization process? (10)
(b) What is socialization? Discuss different roles of agents of socialization highlighting global context. (13 1/3)
8. Write short notes on any three of the following: (23 1/3)
- (a) Diffusion and cultural change
 - (b) Dominant ideology
 - (c) Social norms and social values
 - (d) Ethnocentrism and counter culture.
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