BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1   B. Sc. Engineering Examinations 2014-2015

Sub : **EEE 201** (Electronics I)

Full Marks: 210   Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

SECTION – A

There are **SEVEN** questions in this section. Answer any **FIVE**.

The questions are of equal value.

1. The transistors Q_1 and Q_2 in the circuit shown in Fig. for Q. 1 are identical. Drain current in Q_1 is 0.50 mA. Determine the value of R_D and he drain current in Q_2.

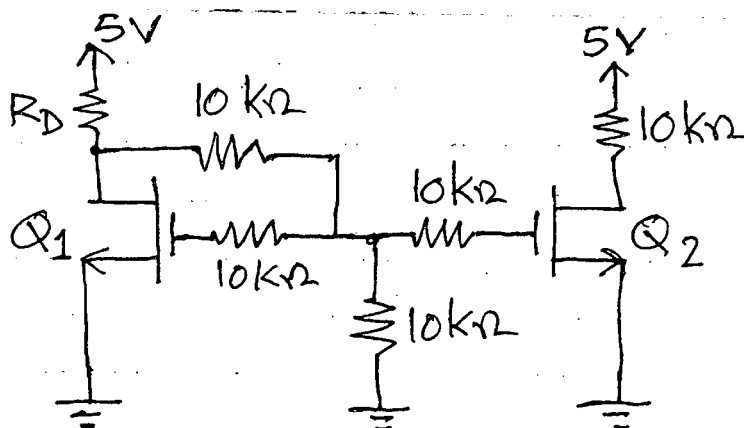Given: $\mu_n C_{ox} \dfrac{W}{L} = 1$ mA/V^2 and $V_t = 1.0$ V.

Fig. for Q. 1.

2. The diode circuit shown in Fig. For Q. 2 is being operated simultaneously by two alternating voltage sources v_Q and v_K. Explain the operation and sketch output voltage, v_0 with time, t for the given time variations of v_Q and v_K. Assume ideal diode.
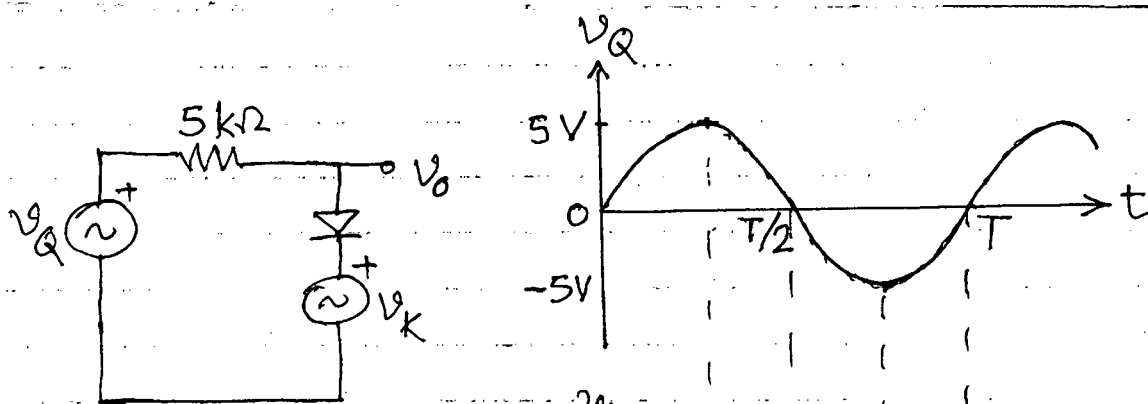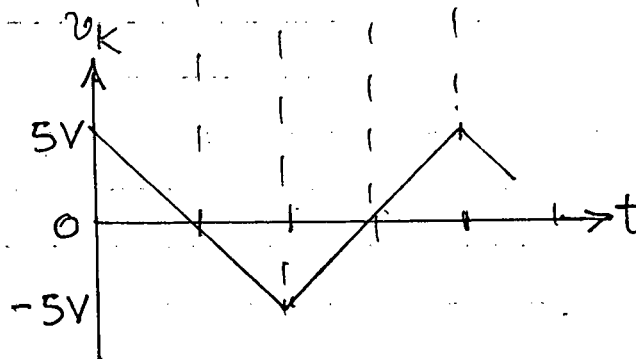

Fig. for Q. 2.

EEE 201

3. Explain carrier transport phenomena in enhancement type MOSFET and derive an expression for the drain current with necessary diagrams.

4. Calculate current flowing through 20 kΩ resistor in the Zener diode circuit shown in Fig. for Q. 4.
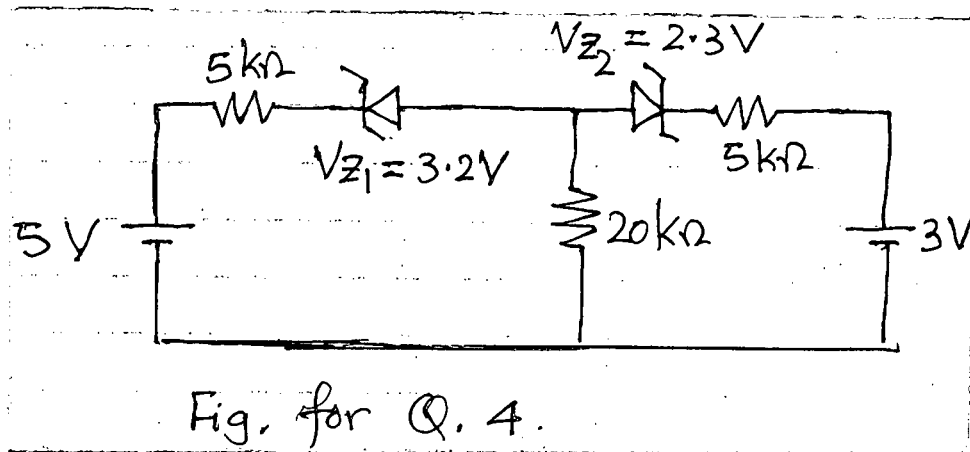

Fig. for Q. 4.

5. Schematic cross sectional view of a silicon CMOS structure is shown in Fig. for Q. 5. The structure is fabricated with an oxide thickness of 9000 pm. Calculate capacitance of the CMOS structure for a positive gate voltage ($V_G > 0$). Given parameters are:

    donor doping concentration = 5×10^{14} cm^{-3}

    acceptor doping concentration = 3×10^{15} cm^{-3}

    gate area of the NMOS = 2×10^{-4} cm^2

    gate area of the PMOS = 3×10^{-5} cm^2

    relative permittivity of SiO$_2$ = 3.9

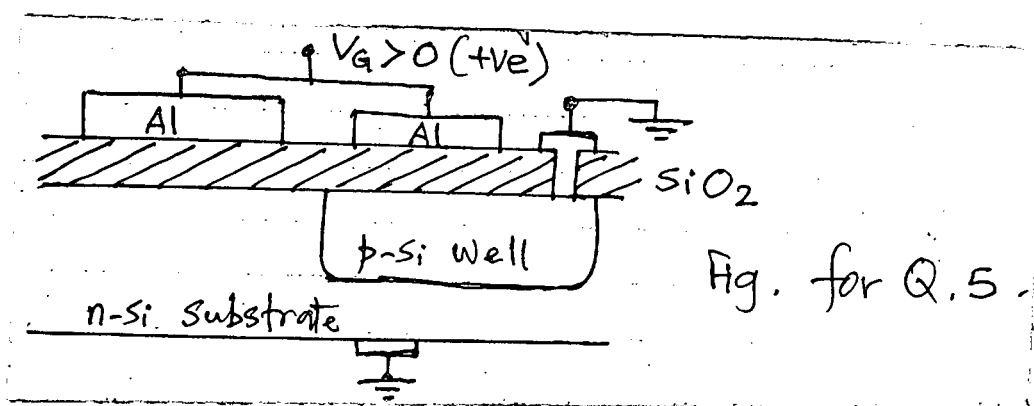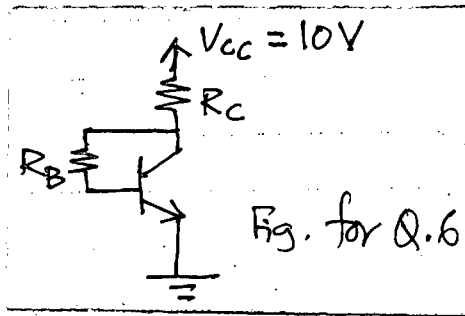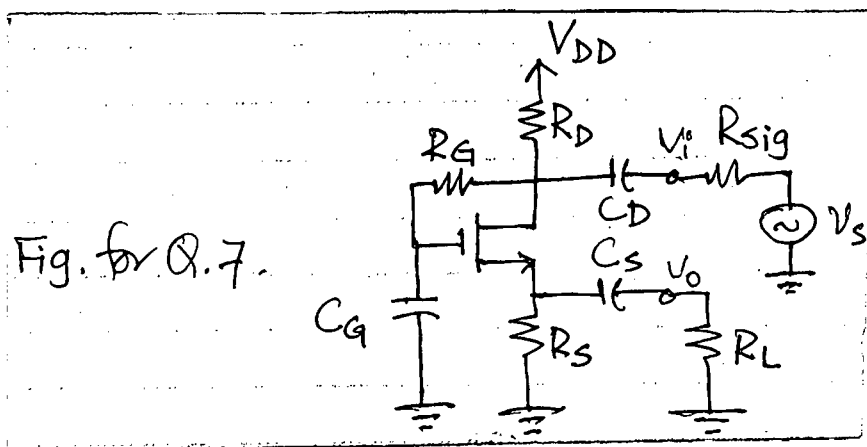Fig. for Q. 5.

6. An npn transistor with a common emitter current gain factor of 99 is operating in active mode. The Q-point is set at (3.5 mA, 5 V) using a biasing circuit as shown in Fig. for Q. 6. Due to a fluctuation in the biasing voltage (V_{CC}), the base current is found to be increased by 15%. Determine the required percentage adjustment of the biasing voltage to keep the Q-point fixed.

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Contd... Q. No. 6

Fig. for Q.6

7. A modified MOSFET amplifier circuit is shown in Fig. for Q. 7. Using small signal equivalent circuit analysis, derive an expression for the voltage gain.

Fig. for Q.7.

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

The figures in the margin indicate full marks. Symbols have their usual meaning.

8. (a) Assuming ideal diodes, find the values of I and V in the circuit shown in Fig. for Q. 8(a). **(15)**
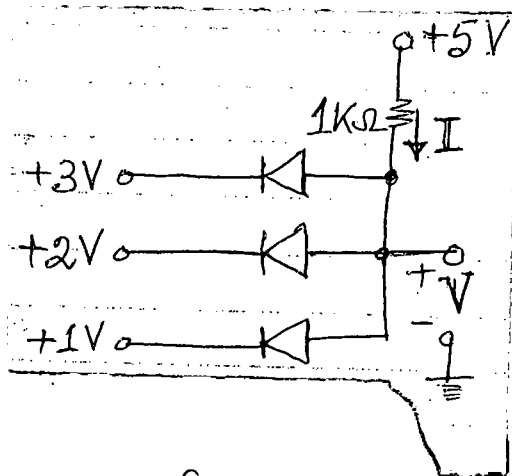
Fig. for Q. 8(a)

(b) The piecewise linear diode model parameters of Fig. for Q. 8(b) are $V_{D_0} = 0.65\,\text{V}$ and $r_D = 20\,\Omega$. Determine I_D and V_D. **(10)**

EEE 201

Contd... Q. No. 8

Fig. for Q. 8(b)

(c) Prove that the small-signal diode resistance can be expressed by $r_d \equiv \dfrac{nV_T}{I_D}$. **(10)**

9. (a) A full-wave bridge rectifier circuit with a 1-kΩ load operates from a 220 V (rms), 50-Hz source through a 10-to-1 step-down transformer. The diodes used for this circuit can be modeled to have a 0.7-V drop for any current. Determine the followings: **(18)**
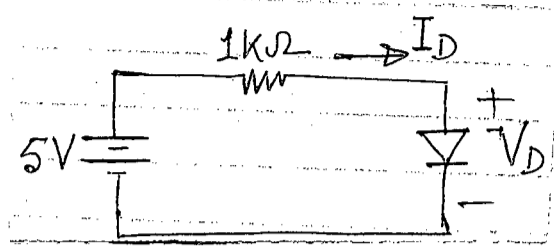
    (i) What is the peak value of the rectified voltage across the load?

    (ii) What is the value of peak inverse voltage?

    (iii) For what fraction of a cycle does each diode conduct?

    (iv) What is the average voltage across the load?

    (v) What is the average current through the load?

(b) It is required to use a peak rectifier to design a dc power supply that provides an average dc output voltage of 15 V on which a maximum of ±1-V ripple is allowed. The rectifier feeds a load of 150 Ω. The rectifier is fed from the line voltage (220 V, 50 Hz) through a transformer. The diodes available have a 0.7-V drop when conducting. If the designer uses the half-wave rectifier circuit, then **(17)**

    (i) Specify the rms voltage that must appear across the transformer secondary.

    (ii) Find the required value of the filter capacitor.

    (iii) Find the peak inverse voltage rating of the diode.

    (iv) Calculate the average current through the diode during conduction.

    (v) Calculate the peak diode current.

10. (a) Determine the wave-shape of output voltage for the circuit shown in Fig. for Q. 10(a). The input voltage is a sine wave of 15 V (peak) and has a time period of 1 ms. The diode has a 0.7 V drop when conducting for all currents. Make necessary assumptions. **(10)**
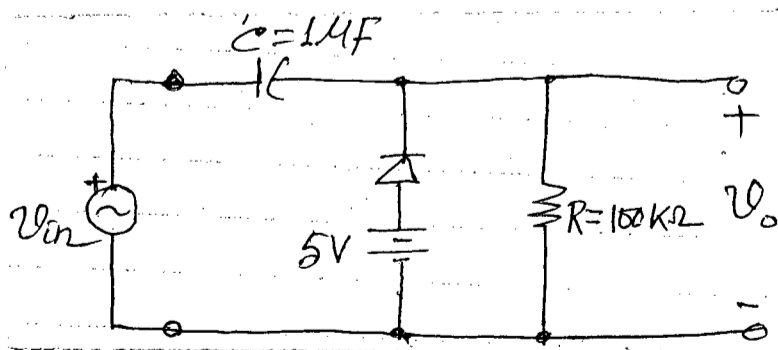
Fig. for Q. 10(a)

EEE 201
Contd... Q. No. 10

(b) Explain the term "Early Effect" in connection with BJT. Assume common emitter configuration for your explanation. Also draw the large-signal model of BJT operating in active mode including Early Effect. **(10)**

(c) For the circuit shown in Fig. for Q. 10(c), the transistor has $\beta = 30$, Find the values of V_B, V_E and V_C. If R_B is raised to 270 kΩ, what voltages result? With $R_B = 270$ kΩ, what value of β would return the voltages to the values first calculated? **(15)**
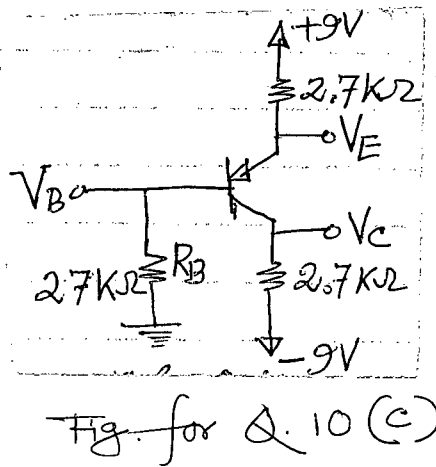
Fig. for Q. 10 (c)

11. (a) For the small-signal operation of a BJT derive the expressions of transconductance (g_m), input resistance in base (r_π), input resistance in emitter (r_e), and voltage gain. **(15)**

(b) For the amplifier circuit shown in Fig. for Q. 11(b), determine **(20)**

    (i)   input resistance R_{in} and output resistance R_{out}

    (ii) the voltage gain v_0/v_{sig}.

Also name the amplifier configuration and mention its application.

Fig. for Q. 11 (b)

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1   B. Sc. Engineering Examinations 2014-2015

Sub : **EEE 203** (Energy Conversion I)

Full Marks: 210   Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.
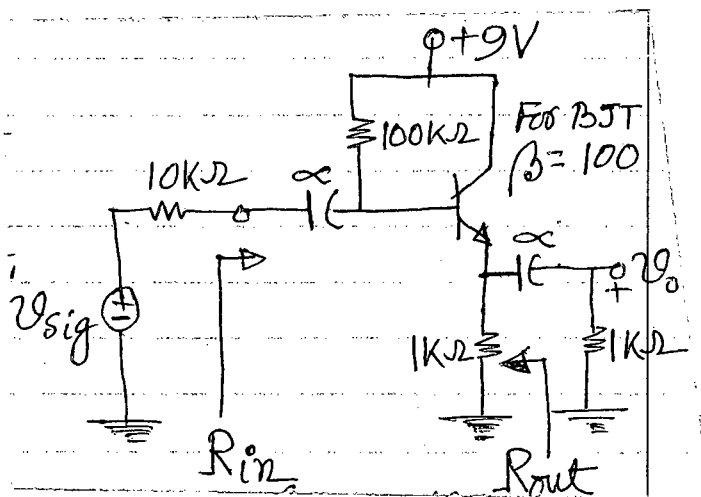
SECTION – A

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

1. (a) Describe the transient behavior of a transformer when loading occurs with necessary equations and figure. **(15)**

    (b) 75-kVA, 4800-240 V, 60 Hz single phase transformer has the following parameters expressed in ohms: **(20)**

$R_{LS} = 0.006$	$R_{HS} = 2.488$	$R_{fe,HS} = 44202$
$X_{LS} = 0.0121$	$X_{HS} = 4.8384$	$X_{M,HS} = 7798.6$

    The transformer is operating in the step-down mode, delivering one half rated load at rated voltage and 0.96 power factor lagging. Determine (i) the equivalent impedance of the transformer referred to high side (ii) the input impedance of the combined transformer and load (iii) the actual input voltage at the high side (iv) the input impedance if the load is disconnected (v) the exciting current for the conditions in (iv).

2. (a) Describe how open circuit test and short circuit tests are performed to determine parameters of a single phase transformer. Show necessary figures. **(15)**

    (b) Data obtained from short circuit and open circuit tests of a 75-kVA 4600–230 V, 60 Hz transformer are **(20)**

Open circuit test (Low side data)	Short circuit test (High side data)
$V_{OC} = 230$ V	$V_{SC} = 160.08$ V
$I_{OC} = 13.04$ A	$I_{SC} = 16.3$ A
$P_{OC} = 521$ W	$P_{SC} = 1200$ W

    Determine (i) the magnetizing reactance and equivalent core loss resistance (ii) the per unit resistance, per unit reactance and per unit impedance of the transformer windings (iii) the voltage regulation and efficiency when operating at rated load and 0.75 power factor lagging.

3. (a) Derive the equation of load division between transformers in parallel having same turns ratio. **(15)**

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Contd... Q. No. 3

(b) A 75-kVA transformer (A) is to be paralleled with a 200-kVA transformer (B). Both transformers have a turns ratio equivalent to their 2400–240 voltage ratio, and are operated in the step down mode. The percent impedance of transformers (A) and (B), based on individual transformer ratings, are 1.64 + j3.16 and 1.10 + j4.03, respectively. Determine (i) the rated high side current of each transformer (ii) the percent of the total bank current drawn by each transformer, (iii) the maximum load that can be handled by the bank without overloading any one of the transformers. **(20)**

4. (a) With necessary figures briefly describe different three phase connections of transformers for triplen harmonic suppression. **(20)**

(b) What is the initial rush of current of a transformer? On what factors do the magnitude of in rush current depend? When will the inrush of magnetizing current be maximum? **(15)**

SECTION – B

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

5. (a) Derive an expression that indicates establishment of rotating magnetic field in the air gap of a three-phase ac motor supplied from a balanced 3-phase supply source. **(15)**

(b) Draw the equivalent circuit of a 3-phase induction motor and hence derive the torque equation considering a balanced 3-phase supply. **(15)**

(c) An open rotor (rotor winding open) induction motor is supplied from an ac mains where the supply frequency is 50 Hz. If the rotor shaft is turned opposite to the direction of rotating magnetic field at a speed of 2000 RPM, determine the rotor impressed voltage frequency (consider a 4-pole motor). **(5)**

6. (a) Why is phase sequence important while connecting a 3-phase induction motor to a supply source? How would you correct an incorrect phase sequence? **(5)**

(b) A 30 HP, 4-pole, 415 V, 50 Hz 3-phase squirrel cage induction motor is supplied from a 50 Hz, 3-phase ac supply mains with line-to-line voltage of 415 V. The motor has the following parameters for its equivalent circuit: **(30)**

Stator leakage reactance = j2 Ω

Rotor leakage reactance = j1.0 Ω

Stator winding resistance = 0.5 Ω

Rotor winding resistance = 0.2 Ω

Stator magnetizing reactance = j100 Ω

Stator core loss at rated voltage = 200 W

(i)   Determine the starting torque of the motor,

(ii) Determine the steady state torque of the motor when it runs at 1450 RPM,

(iii) Determine the maximum developed torque of the motor,

(iv) Determine the speed at which the maximum torque develops.

EEE 203

7. (a) Explain why a 3-phase induction motor draws high inrush current at starting when supplied from a fixed frequency and rated voltage supply source. **(10)**

(b) A 10 HP, 2-pole, 415 V, 50 Hz 3-phase wound rotor induction motor is supplied from a 50 Hz, 3-phase ac supply mains with line-to-line voltage of 415 V. The motor has the following parameters for its equivalent circuit: **(25)**

Stator leakage reactance = j5 Ω

Rotor leakage reactance = j3.0 Ω

Stator winding resistance = 1.5 Ω

Rotor winding resistance = 0.7 Ω

Stator magnetizing reactance = j300 Ω

Stator core loss at rated voltage = 100 W

   (i) Determine the starting current of the motor,

   (ii) What additional resistance per phase should be added to the rotor circuit so that the motor develops maximum torque at starting?

   (iii) What additional resistance should be added to the rotor circuit to limit the starting current to rated value?

8. (a) Explain the quadrature axis field theory for the operation of a single phase induction motor. **(15)**

(b) Explain the principle of operation of an induction generator. **(10)**

(c) Explain why line capacitances are required for an induction generator running in stand alone mode. **(10)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1   B. Sc. Engineering Examinations 2014-2015

Sub : **MATH 259** (Linear Algebra)

Full Marks: 210   Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

Symbols use have their usual meaning.

SECTION – A

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

1. (a) Define orthogonal and idempotent matrices with examples. Prove that the only matrices which commute with an $n \times n$ matrix are the $n \times n$ scalar matrices. Compute AB by the method of conformal portioning of A by B, when $A = \begin{pmatrix} 1 & 2 & 0 \\ 3 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix}$ and

$B = \begin{pmatrix} 2 & 1 & 1 & 0 \\ 1 & 2 & 1 & 0 \\ 2 & 3 & 1 & 2 \end{pmatrix}$.   **(18)**

(b) If $B = \begin{pmatrix} 2 & 1 & 5 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{pmatrix}$ and $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 0 \\ 6 & 7 & 8 \end{pmatrix}$, show that A is non-singular and find the left and right quotients of B by A.   **(17)**

2. (a) Show that elementary transformations do not alter the rank of a matrix. Solve the system of equation
$$\begin{aligned} x_1 + x_2 + x_3 + x_4 &= 4 \\ 2x_1 - x_2 - x_3 + 3x_4 &= 6 \\ 3x_1 + 4x_2 - 5x_3 + 6x_4 &= -11 \\ 7x_1 - 5x_2 + 7x_3 + x_4 &= 46. \end{aligned}$$
                                                       (18)

(b) Define canonical form of a matrix. Reduce the matrix $A = \begin{bmatrix} 1 & -2 & 1 & 3 \\ 4 & -1 & 5 & 8 \\ 2 & 3 & 3 & 2 \end{bmatrix}$ into canonical form. Also find its rank.   **(17)**

3. (a) Find the minimal and characteristic equations of the matrix $A = \begin{bmatrix} 5 & 4 & -1 \\ 4 & 5 & -1 \\ -4 & -4 & 3 \end{bmatrix}$. Is the matrix A derogatory or not? If yes, then express characteristic polynomial as the product of minimal polynomial and one of its monic factors.   **(18)**

MATH 259

Contd... Q. No. 3

(b) Find the eigen values, eigen vectors and characteristic space for the matrix

$$P = \begin{bmatrix} 5 & 3 & -1 \\ 3 & 5 & -1 \\ -3 & -3 & 3 \end{bmatrix}.$$ **(17)**

4. (a) Define semi-definite and indefinite real quadratic forms. Reduce the real quadratic form $q = 4x_1^2 + 3x_2^2 - x_3^2 + 2x_2x_3 - 4x_3x_1 + 4x_1x_2$ to the canonical form and find rank, index and signature of q. Also write down the corresponding equations of linear transformation. **(18)**

(b) State and verify Cayley-Hamilton theorem for the matrix $B = \begin{bmatrix} 4 & -1 & 1 \\ -1 & 4 & -1 \\ 1 & -1 & 4 \end{bmatrix}$. Also find B^{-1}. **(17)**

SECTION – B

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

5. (a) Derive the standard matrices for the following operations on $\mathbf{R}^3$: A rotation of $-30°$ about the x-axis, followed by a reflection about the zx-plane, followed by an orthogonal projection on the yz-plane. Hence find the standard matrix for the stated composition of linear operators on $\mathbf{R}^3$. Also find the image of the triangle with vertices $(-1,0,-3)$, $(2,-2,-3)$, $(-1,-2,3)$ with respect to the stated composition of linear operators $\mathbf{R}^3$. **(18)**

(b) Determine whether the matrix operator $T:R^3 \to R^3$ defined by the equations **(17)**

$$\omega_1 = x_1 + 2x_2 + x_3$$
$$\omega_2 = -2x_1 + x_2 + 4x_3$$
$$\omega_3 = 7x_1 + 4x_2 - 5x_3$$

is one to one; if so find the standard matrix for the inverse operator, and find T^{-1}.

6. (a) Consider the basis $S = \{v_1, v_2, v_3\}$ for R^3, where $v_1 = (1,1,1)$, $v_2 = (1,1,0)$ and $v_3 = (1,0,0)$ and let $T:R^3 \to R^3$ be the linear operator such that $T(v_1) = (-1,2,4)$, $T(v_2) = (0,3,2)$, $T(v_3) = (1,5,-1)$. Find formula for $T(x_1, x_2, x_3)$, and use that formula to find $T(2,4,-1)$. **(13)**

(b) The vectors $v_1 = (1,-2,3,-5)$ and $v_2 = (0,-1,2,-3)$ are linearly independent. Find a standard basis vectors that can be added to the set $\{v_1, v_2\}$ to produce a basis for R^4. **(10)**

(c) Find the eigenvalues and corresponding eigenvectors of the linear transformation T on $\mathbf{R}^3$ defined by the reflection about the yz-plane. Is the transformation one to one. **(12)**

MATH 259

7. (a) Find basis for the column vectors of **A** and null space of $\mathbf{A}^T$. Also verify the dimension theorem for **A**. **(13)**

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

(b) Determine whether the following are subspaces of $\mathbf{M_{nn}}$: **(12)**

   (i)   the set of all $n \times n$ matrices A such that $A^T = -A$.

   (ii) the set of all $n \times n$ matrices A such that $\mathbf{tr}(A) = 0$.

(c) Find three vectors in $\mathbf{R}^3$ which are linearly dependent, and are such that any two of them are linearly independent. **(10)**

8. (a) Determine whether the mapping $\mathbf{T:R^3 \rightarrow R^3}$ defined by **(10)**

$$T(x, y, z) = (x + 2y - z, y + z, x + y - 2z)$$

is a linear operator, if so then find the basis and dimension of (i) lm T and (ii) Ker T.

(b) Let R^4 have the Euclidean inner product. Use Gram-Schmidt process to transform the basis $\{u_1, u_2, u_3, u_4\}$, where $u_1 = (0, 2, 1, 0)$, $u_2 = (1, -1, 0, 0)$, $u_3 = (1, 2, 0, -1)$ and $u_4 = (1, 0, 0, 1)$ into an orthogonal basis $\{v_1, v_2, v_3, v_4\}$; then normalize the orthogonal basis to obtain an orthonormal basis $\{q_1, q_2, q_3, q_4\}$. **(15)**

(c) Find the unknown currents in the circuit shown in figure. **(10)**

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1   B. Sc. Engineering Examinations 2014-2015

Sub : **HUM 135** (English)

Full Marks: 210   Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.
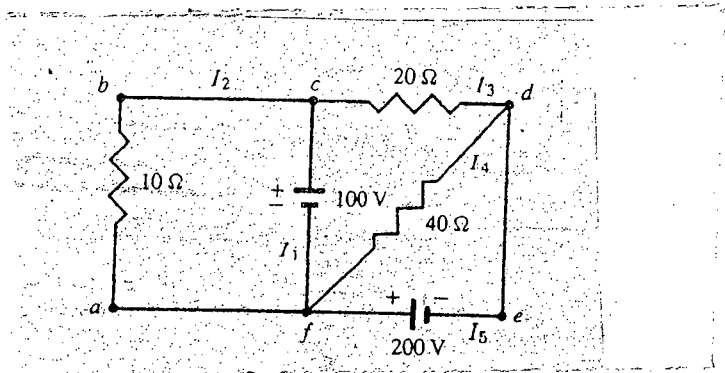
SECTION – A

There are **FOUR** questions in this section. Answer **Q. No. 1** any **TWO** from the rest.

1.   Read the passage carefully and answer the questions those below: **(45)**

Living in a world dominated by media, we meet two concepts of democracy. The one by book refers to a democratic society as one in which the mass have the means to participate in some meaningful ways to manage their own affairs while the means of information are open and free. But the one in practice has mass people barred from managing their own affairs and means of information are rigidly controlled. In this one, mass people are just spectators, not participants and occasionally they 'elect' leaders to 'lend' their burdens— not only because they are considered to be incapable of bearing their own burden but also considered irrational and impulsive therefore are unable to understand and manage "common interest". At this point evolves a "specialized class" who, unlike the mass, can envision, think, act and execute. They tame the mass and employ propaganda to "manufacture concent".

The first ever propaganda operation took place under the supervision of US president Woodrow Wilson who won the 1916 election with the motto, "Peace Without Victory". But within six months, his WWI commission turned "pacifist [American] population"— who previously had found no reason to join a European war— into a "hysterical, war-mongering" one. The two folds of that propaganda represented the Germans as diabolic and emphasized the responsibility of the Americans to save the world from this demon. Closely followed the second one which generated "Red Scare" which threatened and undermined the radical communist thinkers/activists/unions. In both cases, the media, the business-owners and the intellectuals were much (pro-)active which proves that, "state propaganda, when supported by the educated classes and money-mongers, with media permitting no deviations, can have a big effect" (Noam Chomsky).

Hitler learned much from this lesson.

Questions:

(a)   Identify the major differences between the two types democracy the passage talked about.

(b)   How do you think the second concept of democracy cater to the needs of the establishment/state/authority?

(c)   What is propaganda? Which factors, according to the writer, help it happen?

(d)   What does the author mean by "Specialized class"? How does it function?

(e)   Provide an appropriate title for the piece above and give reasons to substantiate that.

HUM 135

2. (a) Describe the following styles of presentation in business letters: Indented, Hanging-Indented, Block, Semi-block, Complete Block style. **(10)**

(b) Write a letter inviting quotations, to OTOBI for the furniture of your new bookstore on the third floor of Rafin Plaza, Nilkhet. **(10)**

(c) Give phonetic transcriptions of the following words (any five): **(10)**

Highway, Engineer, Congratulation, Angel, Boatman, Farmer

3. (a) What is plagiarism? Why should one beware of it? **(5)**

(b) Write a composition on any one of the following: **(15)**

    (i) Padma Bridge

    (ii) Brain Drain

    (iii) Sleeping in the class.

(c) Write a dialogue between a globetrotter and a tour guide in Dhaka. **(10)**

4. (a) Transform the following sentences as directed (any five): **(10)**

    (i) Nobody will be allowed to enter the hall without a ticket. (Complex)

    (ii) Only those boys who work hard, will succeed. (Simple)

    (iii) You must avoid fat to lose weight. (Complex)

    (iv) He kept his promise. (Compound)

    (v) Do it or you will be punished. (Complex)

    (vi) They cried as loudly as possible. (Simple)

(b) What are the components of back matter? Describe. **(5)**

(c) Write short notes on <u>any three</u> of the following: **(15)**

    (i) Inventory Report.

    (ii) Monophthongs

    (iii) Steps of Collection Procedure

    (iv) Consonants

SECTION – B

There are **FOUR** questions in this section. Answer **Q. No. 5** any **TWO** from the rest.

5. (a) Explain with reference to the context <u>any two</u> of the following: **(15)**

    (i) "Here was I the white man with his gun, standing in front of the unarmed native crowd— seemingly the leading actor of the piece."

    (ii) "Long practice had sharpened his perception".

    (iii) "This is our island. It's a good island. Until the grown ups come to fetch us well have fun."

HUM 135

Contd... Q. No. 5

    (b) Answer <u>any one</u> of the following: **(15)**

      (i)   Do you think the astrologer, in Narayan's "An Astrologer's Day", is a trickster or just an actor in the battlefield of life's reality?

      (ii)   What leads Maugham in "The Use of Philosophy" to realize that philosophy is a subject for the experts? Explain.

    (c) Answer <u>any three</u> of the following: **(15)**

      (i)   What evidence do you find in "Shooting an Elephant" that proves a strong anti-European sentiment existing among the natives?

      (ii)   Give an account of the first meeting of the children on the desert island in the story of "Fire on the Mountain".

      (iii) "A great load is gone from me today." Who said this and why?

      (iv) What is Maugham's opinion about Bertrand Russell?

      (v)   Give a description of the Fire-making scene in the story of "Fire on the Mountain".

6.   (a) Recast and correct <u>any ten</u> of the following sentences: **(15)**

      (i)   Let us look into the agenda of the last five meetings.

      (ii)   There is no flight to Chittagong this morning.

      (iii) He has ordered for a cup of tea.

      (iv) She was the only alumni present at the ceremony.

      (v)   We shall go to the stadium providing that the weather is good.

      (vi)   Knowing it might rain, an alternative plan for the ceremony was made.

      (vii) We had rather an enjoyable holiday, thank you.

      (viii) I insisted him to go away.

      (ix)   If I had reached there in time, I have then caught the bus.

      (x)   The month proceeding June was, of course, May.

      (xi)   Everybody accept their responsibilities.

      (xii) It's a long way home.

    (b) Give meanings of and make sentences with <u>any ten</u> of the following words: **(15)**

      Amicable, Bewilder, Cogent, Fatter, Impromptu, Mumble, Retain, Roam, Spill, Trivial, Vendor, Shabby.

7.   (a) Amplify the idea in <u>any one</u> of the following: **(30)**

      (i)   Procrastination is the thief of time.

      (ii)   Peace hath her victories no less renowned than war.

HUM 135

8. Write a precis of the following: **(30)**

The first thing needed in education is thoroughness of knowledge. The variety of subjects of study which are offered to us in modern times, the many new sciences and branches of science which have been opened out to us within the last century, the natural eagerness of youth to sip, one after another, at the beautiful flowers which grow to richly in the garden of learning, all tend to tempt youngmen to superficiality and turn them aside from depth. If you measure the result of the education which a man has received not only by the number of topics upon which he talks fluently in ordinary society, but by the number of those of which he has a real grasp, not by the books he has read, but by those he has digested, not by the facts which he has laid up in his memory, but by the accuracy of his judgement, the strength of his reasoning powers, and the force of his intellect you will soon be convinced that more real mental training is to be derived from the thorough study of a single subject than from the skin-dup acquaintance with a hundred sciences.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY, DHAKA

L-2/T-1   B. Sc. Engineering Examinations 2014-2015

Sub : **HUM 277** (Fundamentals of Economics)

Full Marks: 210   Time : 3 Hours

USE SEPARATE SCRIPTS FOR EACH SECTION

The figures in the margin indicate full marks.

SECTION – A

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

Symbols indicate their usual meaning.

1. (a) Define demand function.   **(5)**

   (b) What are the factors that influence the shifting of the demand curve?   **(10)**

   (c) How would you derive the market demand curve of a commodity? Explain graphically.   **(10)**

   (d) What are the main determinants of supply?   **(10)**

2. (a) What are the determinants of price elasticity of demand? Explain them.   **(10)**

   (b) What is the relation between price elasticity of demand and total revenue? There are two parallel straight line demand curves. Show that the curve which is nearer to the origin has a higher price elasticity of demand at any point. Explain graphically.   **(15)**

   (c) From the following table calculate elasticity of demand if you move from point A to C and explain what you understand from the result.   **(10)**

POINT	P_x	Q_y
A	500	120
B	600	150
C	700	180

3. (a) How would you measure inequality in terms of size distribution of income?   **(20)**

   (b) Explain how extreme inequality in income distribution slows down economic development of a country.   **(15)**

4. Write short notes on any THREE of the following   **(35)**

   (i)   Absolute poverty and poverty gap

   (ii)   Net Present Value (NPV)

   (iii) Human Development Index (HDI)

   (iv) The procedure of a Cost-Benefit Analysis (CBA)

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SECTION – B

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

5. (a) What is the basis of distribution of production among the factors of production? If all the factors of production are paid as rewards equal to their marginal products, would the total product be just exactly exhausted? Explain. **(15)**

   (b) Discuss in detail the concept of optimization. **(10)**

   (c) Explain the various classifications of market. **(5)**

   (d) What are the conditions of monopoly market? Explain, what are the barriers which prevent a firm to enter the monopoly industry? **(5)**

6. (a) Explain the nature of demand curve under monopoly market. Graphically explain the short run equilibrium of a firm under monopoly market. **(10)**

   (b) Given the following total revenue (TR) and total cost (TC) functions for a firm **(15)**

   $$TR = 4350Q - 13Q^2$$
   $$TC = Q^3 - 5.5Q^2 + 150Q + 675$$

   where Q is quantity of output.
   - (i) Set up the profit function.
   - (ii) Find the quantity which makes the profit maximum.
   - (iii) Find the maximum profit and verify that is maximized.

   (c) Distinguish between the concepts of gross national product (GNP) and gross domestic product (GDP). **(5)**

   (d) Discuss the circular flow of income and expenditure in a two sector economy. **(5)**

7. (a) Explain the various methods of measuring national income of our country. **(10)**

   (b) Calculate national income from the following information: **(10)**
   - GNP = Tk. 1,17,000 crore
   - Depreciation = Tk. 10,500 crore
   - Indirect tax = Tk. 12,500 crore
   - Subsidy is 20% of indirect tax.

   (c) What is meant by the concept of inflation? What are the causes of inflation? Discuss. **(5)**

   (d) Which are the necessary policies for controlling inflation in our country? Explain in short. **(10)**

8. (a) Distinguish between economic growth and economic development. **(5)**

   (b) What are the five main obstacles to economic development in Bangladesh? Explain. **(15)**

   (c) Discuss how Bangladesh can overcome these obstacles. **(15)**