SE ETRX Sem-IV 10/6/2014

Fundamentals of C.E.

QP Code : NP-19833

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No. 1 is **compulsory**.
(2) Solve any **three** questions from the remaining **five** questions.
(3) Assume **suitable** data if **necessary**.

1. Give brief answers to any **four** of the following :– **20**
   (a) Explain ground wave propagation of electromagnetic radiations.
   (b) Draw the spectrum of an amplitude modulated wave and explain its components.
   (c) Give advantages and disadvantages of SSB over full carrier DSB amplitude modulated wave.
   (d) Discuss the factors that influence the modulation index of an FM wave.
   (e) How is adaptive delta modulation superior to delta modulation ?

2. (a) What is a DSBSC wave ? Explain its generation using balanced modulator. **10**
   (b) Discuss the factors that influence the choice of IF in superheterodyne receivers. **5**
   (c) The maximum deviation allowed in a FM broadcast system is 75 kHz. If the modulating signal is a single tone sinusoidal of frequency 15 kHz, find the bandwidth of the FM signal. How does the bandwidth change if the modulating frequency is doubled ? **5**

3. (a) How can you use a varactor diode in the generation of FM wave ? Explain in detail. **10**
   (b) List out the advantages and disadvantages of FM over AM. **5**
   (c) Calculate the thermal noise power available from any resistor at a temperature of 290 K for a bandwidth of 1 MHz. Calculate also the corresponding noise voltage if the resistance, R = 100 Ω. **5**

4. (a) Draw the PAM, PWM and PPM waveforms in time domain assuming a sinusoidal modulating signal. Explain them in brief. **10**
   (b) What do you understand by signal multiplexing ? Explain TDM and FDM with suitable examples. **10**

5. (a) Explain the working of a superheterodyne receiver with the help of a neat block diagram. Show the waveforms at the output of each block. **10**
   (b) Compare analog and digital transmission systems. **5**
   (c) What is VSB ? Mention its application. **5**

6. Write short notes on any **four** of the following :– **20**
   (a) Pre-emphasis and de-emphasis
   (b) Automatic gain control
   (c) Ratio detector
   (d) Electromagnetic spectrum
   (e) Noise figure.

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SE SEM IV (ETRX) (CBGS)
PCS 04/06/14

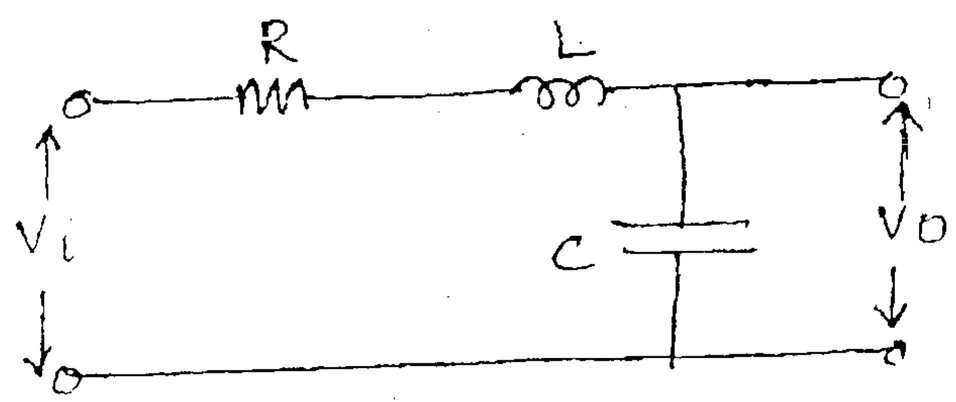
QP Code : **NP-19794**

(3 Hours) **[Total Marks : 80**

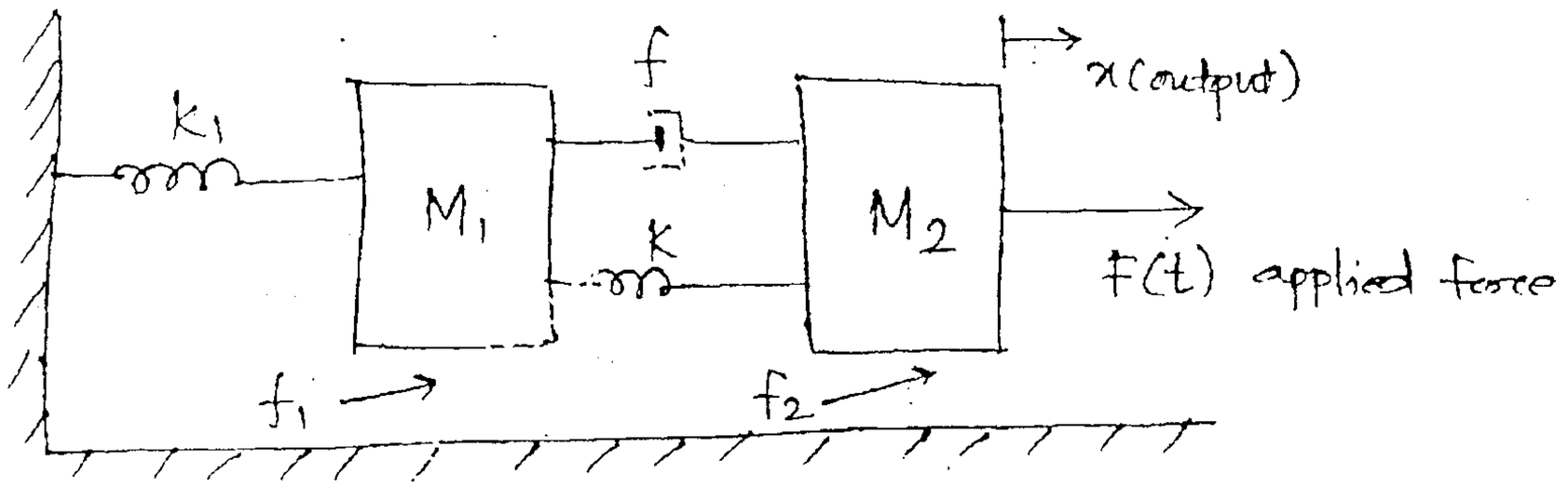
N.B. (1) Question No. **1** is **compulsory.**
(2) Attempt any **three** questions from remaining questions.
(3) Assume suitable data wherever **necessary.**

1. Attempt any **four** :– **20**

(a) Differentiate between feedback and feed forward control system.
(b) What is a compensator ? Why is it required ?
(c) What are the properties of state transition matrix ?
(d) Explain the concept of absolute, relative and robust stability.
(e) Find the transfer function for following network.



2. (a) Obtain the transfer function of the mechanical system. **10**



(b) Consider unity feedback control system with an open loop transfer function of – **10**

$$G(s) = \frac{k(s+1)(s+2)}{(s+0.1)(s-1)}$$

(i) Plot the root loci showing asymptotes, centroid, break away point, the gain at which root locus crosses jw axis.
(ii) Find value of gain for which a closed system is critically damped.

3. (a) A unity feedback control system is characterized by the open loop transfer function. **10**

$$G(s) = \frac{k(s+13)}{s(s+3)(s+7)}$$

using the Routh criterion, calculate the range of values of k for system to be stable.

(b) Write a note on advances in control systems. **10**

4. (a) Obtain the state variable model of the transfer function– **10**

$$\frac{Y(s)}{U(s)} = \frac{s^2+3s+3}{s^2+2^2s+3s+1}$$

(b) Sketch the Bode plot for the open loop transfer function given by– **10**

$$G(s)\ H(s) = \frac{0{\cdot}5(1+5s)}{s^2(1+0{\cdot}5s)}$$

5. (a) Find rise time, settling time and peak overshoot for the system given by transfer function– **5**

$$G(s) = \frac{25}{(s^2+8s+25)}$$

(b) Using Nyquist criterion, determine the closed loop system having following open loop transfer function is stable or not. If not, find number of poles in right half of s plane – **5**

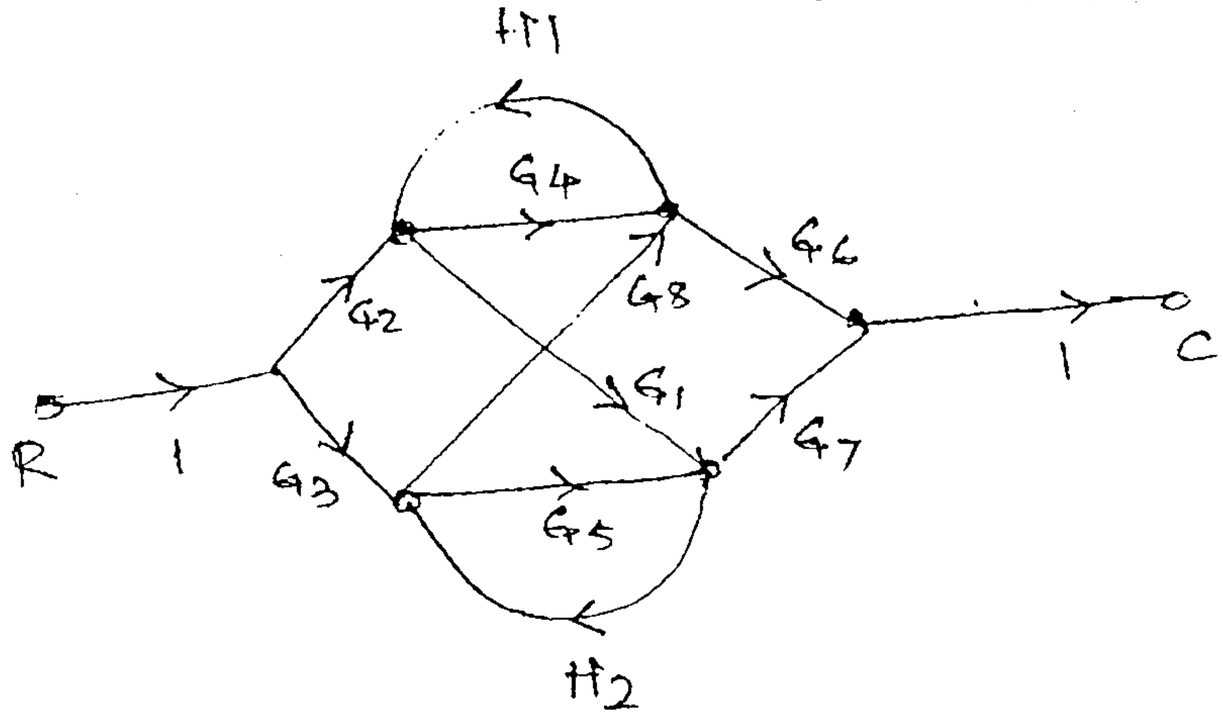
$$G(s)\,H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$

(c) Check controllability and observability for the system– **10**

$$\dot{x} = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 3 \\ 1 & 1 & 1 \end{bmatrix} x + \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} u$$

$$y = [\,1 \quad 3 \quad 0\,]\,x$$

6. (a) Explain the concept of on-off controller using example. **5**
   (b) Compare lead-lag compensator. **5**
   (c) Obtain the overall transfer function from signal flow graph. **10**



SE - ETRx & EXTC
Sem - IV - AM-IV (CBGS)
Dt: - 23/05/14

QP Code : **NP-19713**

(3 Hours) [Total Marks : 80

N.B.: (1) Quesions No. **1** is **compulsory**.
(2) Solve any **three** from the **remaining**.

1. (a) Prove that Eigen values of a hermitian matrix are real. 5

(b) Evaluate $\oint_c \frac{e^{kz}}{z} dz$ over the circle $|z|=1$ and k is real. Hence prove that $\int_0^{\pi} e^{k\cos\theta} \cos(k\sin\theta)\, d\theta = \pi$. 5

(c) Find the extremal of $\int_{x_2}^{x_1} \left(16y^2 - (y'')^2 + x^2\right) dx$ 5

(d) Find a vector orthogonal to both u = (–6, 4, 2) and v = (3, 1, 5). 5

2. (a) Find the curve y = f(x) for which $\int_{x_1}^{x_2} y\sqrt{1+(y')^2}\, dx$ is minimum subject to the constraint $\int_{x_1}^{x_2} \sqrt{1+(y')^2}\, dx = \ell$. 6

(b) Find eigen values and eigen vectors of the matrix $A = \begin{bmatrix} -2 & 5 & 4 \\ 5 & 7 & 5 \\ 4 & 5 & -2 \end{bmatrix}$ 6

(c) Obtain Taylor's series and two distinct Laurent's series expansion of $f(z) = \frac{z^2 - 1}{z^2 + 5z + 6}$ about z = 0, indicating region of covergence. 8

3. (a) State Cayley-Hamilton Theroern, hence deduce that $A^8 = 625I$, where $A = \begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$ 6

(b) Using calculus of Residues, prove that $\int_0^{2\pi} e^{\cos\theta} \cos(\sin\theta - n\theta)\, d\theta = \frac{2\pi}{n!}$. 6

(c) Find the plane curve of fixed perimeter and maximum area. 8

[TURN OVER

4. (a) State Cauchy-Schwartz inequality and hence show that $\left(x^2+y^2+z^2\right)^{1/2} \geq \frac{1}{13}\left(3x+4y+12z\right)$, x, y, z are positive. 6

(b) Reduce the quadratic form $Q = x^2+y^2-2z^2-4xy-2yz+10xz$ to Canonical form using congruent transformation. 6

(c) (i) If $A = \begin{bmatrix} \pi/2 & 3\pi/2 \\ \pi & \pi \end{bmatrix}$, find Sin A. 4

(ii) Show that the matrix $A = \begin{bmatrix} 5 & -6 & -6 \\ -1 & 4 & 2 \\ 3 & -6 & -4 \end{bmatrix}$ is Derogatory. 4

5. (a) Using Rayleigh - Ritz method, find an appropriate solution for the extremal of the functional $I[y(x)] = \int_0^1 \left[xy + \frac{1}{2}\left(y^1\right)^2 \right] dx$ subject to $y(0) = y(1) = 0$. 6

(b) Find an orthonormal basis of the following subspace of R^3, $S = \{ [1, 2, 0]\ [0, 3, 1] \}$. 6

(c) Is the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ diagonalizable. If so find diagonal form and transforming matrix. 8

6. (a) Find f(3), f ' (1 + i), f " (1 – i), if $f(a) = \oint_c \frac{3z^2+11z+7}{z-a}\,dz$, $c: |z| = 2$. 6

(b) Evaluate $\int_0^\infty \frac{x^3 \sin x}{\left(x^2+a^2\right)^2}$ using contour integration. 6

(c) Find the singular value decomposition of the matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \\ 1 & -1 \end{bmatrix}$. 8

S.E. (ETRX) sem IV (CBSGS) M- 2014

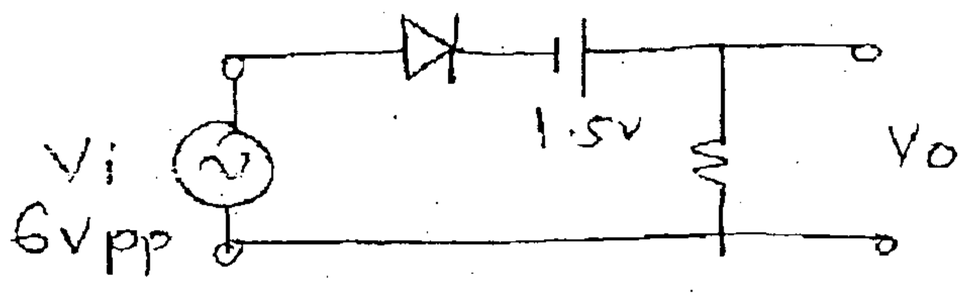
Sub:- DEC 19/5/14

QP Code :**NP-19679**

(3 hours) **[Total Marks : 80**

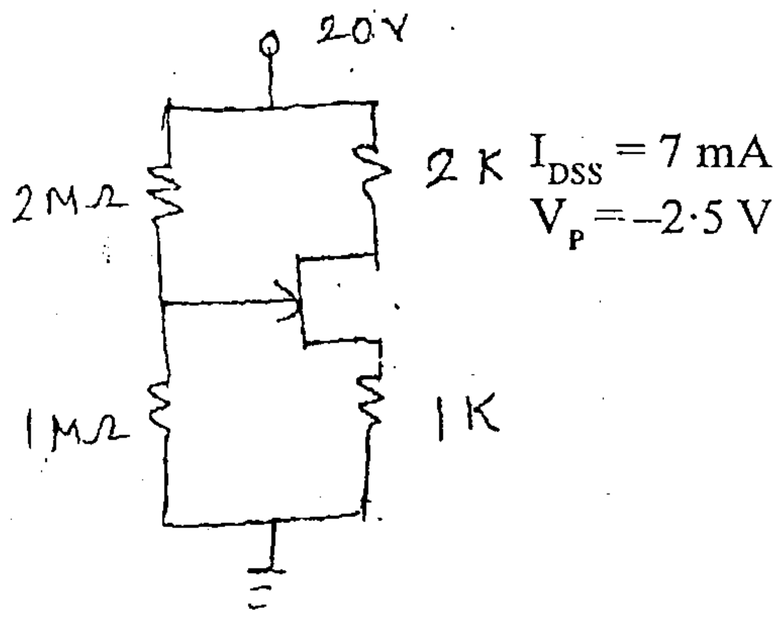
N.B.: (1) Question no. **1** is **compulsory**.
(2) Solve any **three** out of **remaining** questions.
(3) Assume **suitable** data wherever **necessary**.

1. Solve any **four** :– **20**
   (a) For the following clipper circuit sketch the i/p and o/p wave form write equation for Vo. **5**



   (b) Compare BJT, JFET and MOSFET. **5**
   (c) Which components in an amplifier (CS and CE) circuit affect low frequency response ? Explain. **5**
   (d) State and explain Barkhansen's criteria. **5**
   (e) Explain effect of swamping resistor in differential amplifier. **5**
   (f) Derive expresion of efficiency of clan A Transformer coupled amplifier. **5**

2. (a) Draw approximate hybrid π model of CE transistor amplifier and derive expressions for Av, Ai, Zi and Zo. **10**
   (b) Determine operating point and draw DC load line for the circuit shown :– **10**



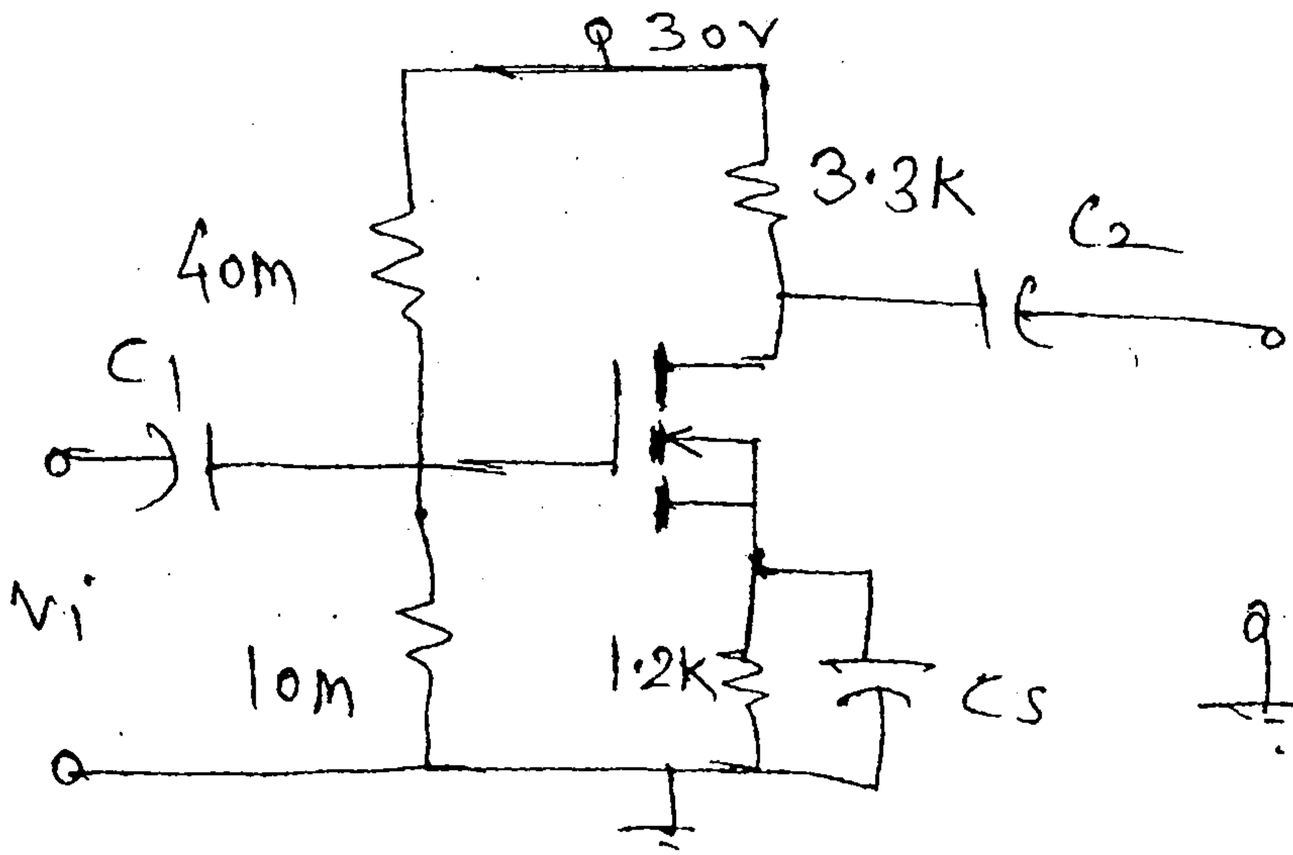
3. (a) Draw two stage CS-CS amplifier circuit and derive expressions for Av, Zi and Zo. **10**
   (b) State different types of negative feedback topologies and explain current series in detail using block diagram. **10**

4. (a) Draw circuit diagram for dual i/p balanced o/p differential amplifier (using any type of devices) and derive expressions for Ad, Ac, CMRR and Ri. **10**
   (b) Draw circuit diagram of colpitt's oscillator and explain it's working. State applications, advantages and disadvantages of this circuit. **10**

[TURN OVER

5. (a) Justify need for constant current source and explain any one in detail. **10**
   (b) Explain working of class B (push-pull) power amplifier. **10**

6. (a) For the circuit shown find Av, Ri and Ro. **10**



   (b) Draw High frequency model for CS JFET amplifier and explain. **5**
   (c) Explain importance and need for biasing in amplifier. **5**

SE CETRX) Sem IV EM. 16/6/2014
(CBGS)

QP Code : NP-19871

Duration 3 Hours | Total marks assigned to the paper- 60

N.B. 1. Question No. 1 is compulsory
2. Solve any three out of remaining five questions
3. Figures on right indicate full marks
4. Assume suitable data, if necessary.

Q1) solve any three [15]

a) The armature of d.c. generator has 81 slots and the commutator has 243 segments. It is wound to give lap winding having 1 turn per coil. If the flux per pole is 30 mωb, calculate the generated emf, at a speed of 1200r.p.m. number of poles is 6.

b) Explain the necessity of starter in D.C. motor.

c) What is slip in induction motor? If a 6 pole 3 phase induction motor is connected to 50 Hz supply. If it is running at 970 r.p.m. find the slip.

d) Which are the methods employed to make the single phase induction motor self-starting.

e) State the application areas of brushless d.c. motor.

f) Calculate the stepping angle for 1. A 3 phase, 16 tooth rotor variable reluctance motor. 2. A 3 phase, 24 pole variable reluctance.

Q2) a) Explain with neat sketches the armature reaction in d.c. machine. [7]

b) A 240 V d.c. shunt motor runs at 800 r.p.m. And takes armature current of 2A. Find the resistance required in series with the shunt winding so that the motor may run at 950 r.p.m. when taking an armature current of28A. Assume flux is proportional to field current. Shunt field resistance is 160Ω, armature resistance is 0.4Ω. [8]

[TURN OVER

Q3) a) the power input to a 6 pole, 3 phase, 50 Hz induction motor is 42 KW, the speed is 970 r.p.m. the stator losses are 1.2 KW and the friction and windage losses are 1.8 KW. Find 1. The slip 2. The rotor copper loss 3. The b.h.p. and 4. The efficiency. [8]

b) Explain different starting methods of 3 phase induction motor. [7]

Q4) a) A 2 pole, 240V, 50 Hz, single phase induction motor has following constants referred to the stator

$R_1 = 2.2\Omega$, $X_1 = 3.0\Omega$, $R_2' = 3.8\Omega$, $X_2' = 2.1\Omega$, and $Xm = 86\Omega$.

Find the stator current and input power when the motor is operating at a full load speed of 2820 r.p.m. [8]

b) Explain the double field revolving theory in single phase induction motor. [7]

Q5) a) Explain construction, working and operation of switched reluctance motor with its advantages. [8]

b) Explain construction and operation of variable reluctance stepper motor. [7]

Q6) a) State the advantages of brushless d.c. motor and explain any one brushless d.c. motor [7]

b) Explain working principal of 3 phase induction motor and how the rotating magnetic field produced in 3 phase induction motor. [8]

29/5/14 SEM-IV (ETRX)
Microprocessors & Peripherals

QP Code : NP-19758

(3 Hours) **[Total Marks : 80**

N.B. : 1.Question no. 1 is compulsory
2. Solve any three from the remaining five questions.
3. Assume suitable additional data if necessary.

Q1) Answer the following questions: (20 marks)
a) Explain flag register of 8085 microprocessor.
b) What is REP prefix? How it functions for string instructions?
c) Explain the feature of pipelining and queue in 8086 architecture.
d) Explain the significance of HOLD, RESET and READY signals in 8086 processor.
e) For 8086 op-code fetch machine cycle explain the significance of each T-state.

Q2)a) Draw and explain the instruction template format of 8086 processor ? (10marks)
b) Explain programmable interrupt controller 8259 – features and operation. (10 marks)

Q3) a) Explain 8086-8087 coprocessor configuration in maximum mode of operation. (10 marks)
b) Explain the following 8086 instructions
a) CMPSB b) DIV AX c) LOOPE again d) REP SCASB e) XLATB (10marks)

Q4) a) Write a detailed note on the interrupt structure of 8086 processor. (6 marks)
b) What are the basic modes of operation of 8255, Explain with the format of control register. (4marks)

b) Explain the need for DMA and modes of DMA data transfer. (10 marks)

Q5) a) Explain the architecture of 8086 processor. What is the need for memory segmentation. (10 marks)
b) With the help of a neat flowchart/algorithm write a program in 8086 assembly to arrange a set of ten 8-bit numbers initialized in data segment in ascending order. (10 marks)

Q6) a) Write a brief note on programmable peripheral interface (PPI) IC – 8255 and its modes of operation. (10 marks)
b) Using string instructions write a program in 8086 assembly to copy a block ten bytes initialized in data segment to extra segment. Assume the necessary details. (10 marks)
