SEM-IV SE (ETRX) CBSGS 25/5/16

Microprocessor & Peripherals **Q.P. Code : 548001**

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

N.B. 1) Question **number 1** is compulsory.
2) Attempt **any three** from remaining five questions.
3) Assume suitable data wherever necessary.
4) Figure to **the right** indicates full marks.

Q1. Attempt any four from the following (20)
a) At reset, interrupts in 8086 processor are disabled. Give reason.
b) List the differences between 8086 and 8088 processor.
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) Classify and explain 8086 instruction set. (10)
b) Explain programmable interrupt controller 8259 – features and operation. (10)

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

Q4) a) Write a detailed note on the interrupt structure of 8086 processor. (10)
b) Explain the need for DMA and modes of DMA data transfer. (10)

Q5) a) Explain the architecture of 8086 processor. What is the need for memory segmentation. (10)
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)

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

Sem-IV/CBGS 13/05/16

ETRX/EDC DEC

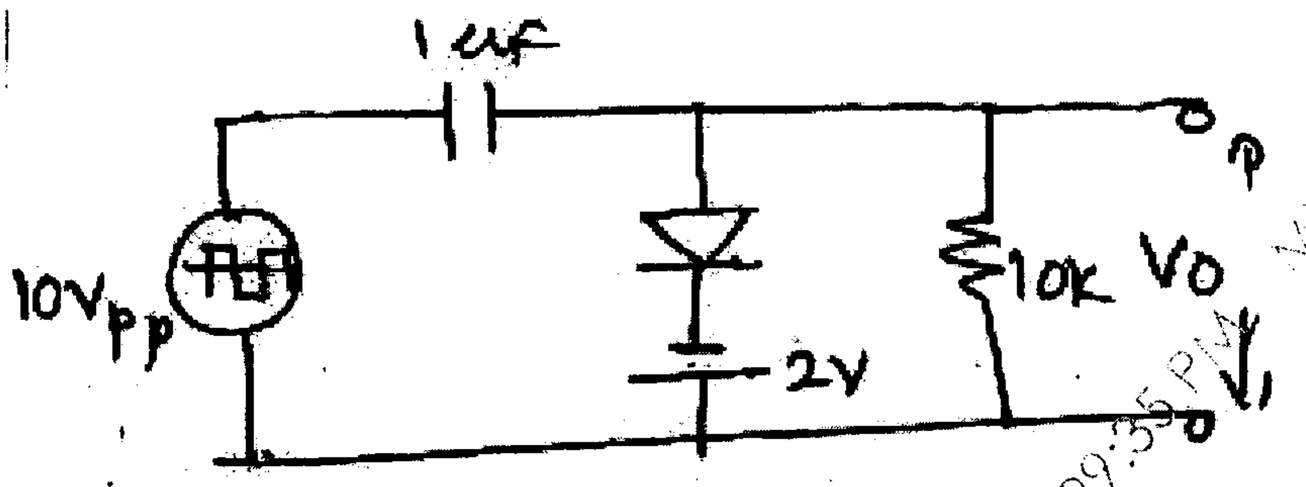
QP Code : 547800

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

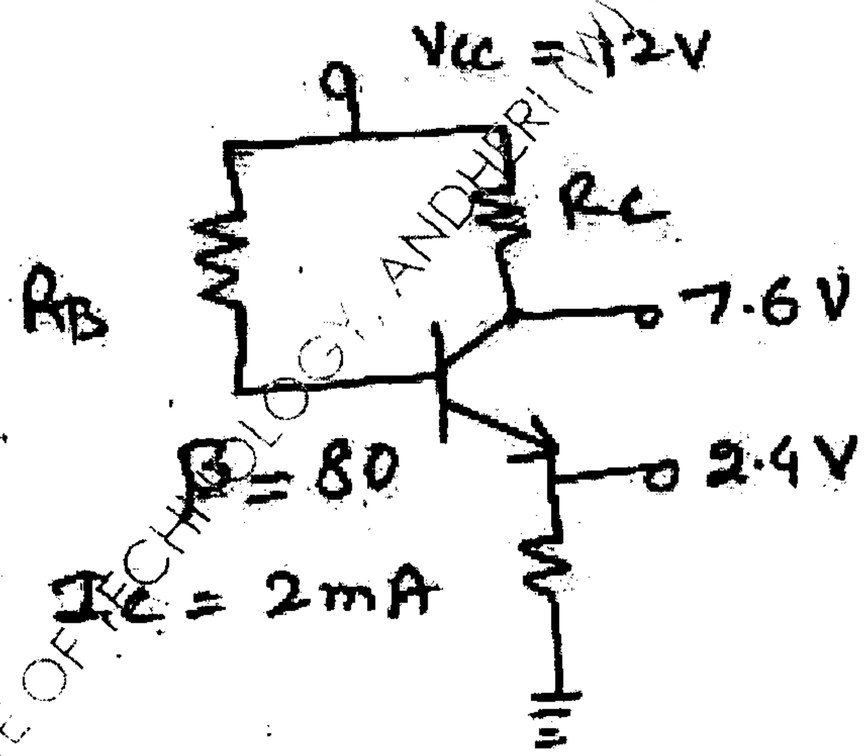
N.B. : (1) Question no. **1** is **compulsory** and solve any three out of remaining questions.
(2) Assume suitable data if necessary.

1. Solve any **five** **20**

(a) Identify the circuit and draw output waveform with proper voltage levels.



(b) Determine R_C and R_B for the following circuit. Assume VBE= 0.7V



(c) Compare D-MOSFET and E-MOSFET Considering Construction and characterists.
(d) Explain working of Darlington connection and it's advantages.
(e) State and explain Bark hausen Criteria.
(f) Compare class A with Class AB power amplifier.

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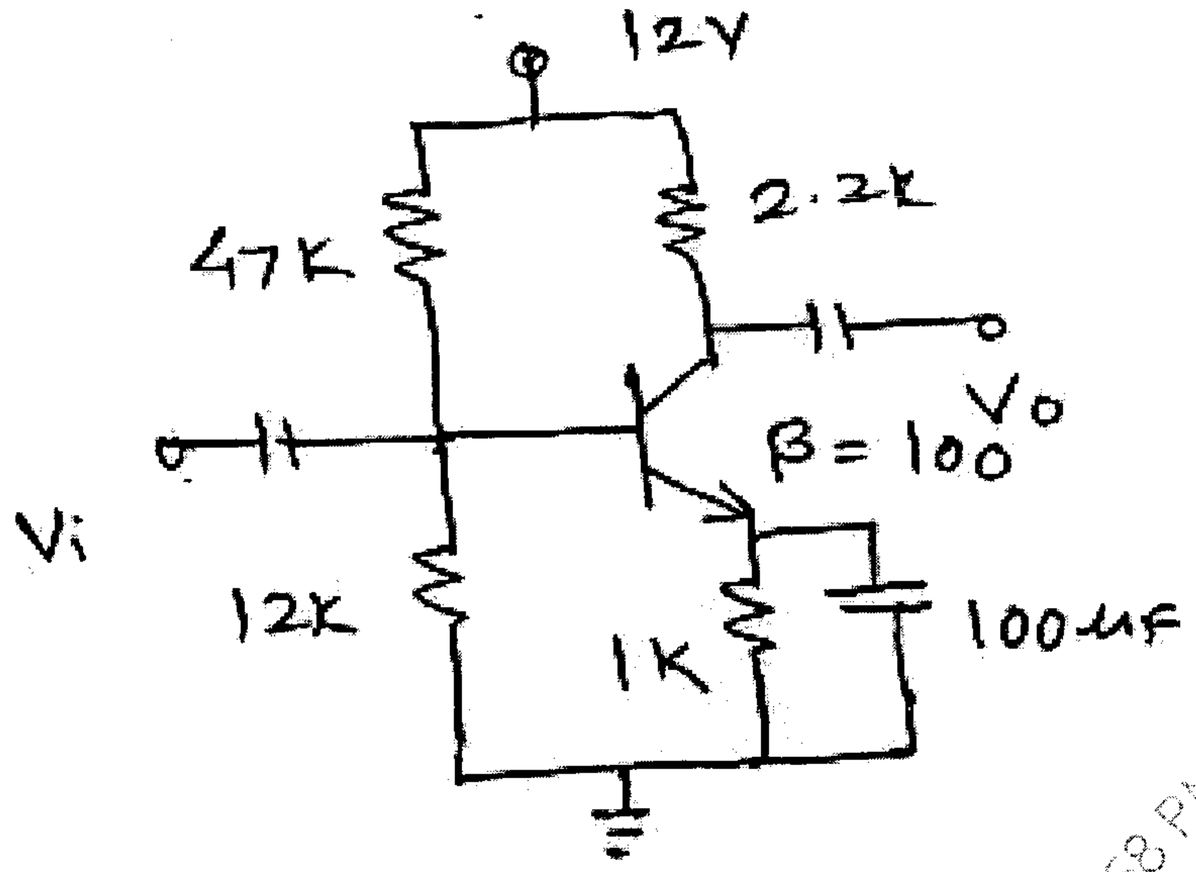
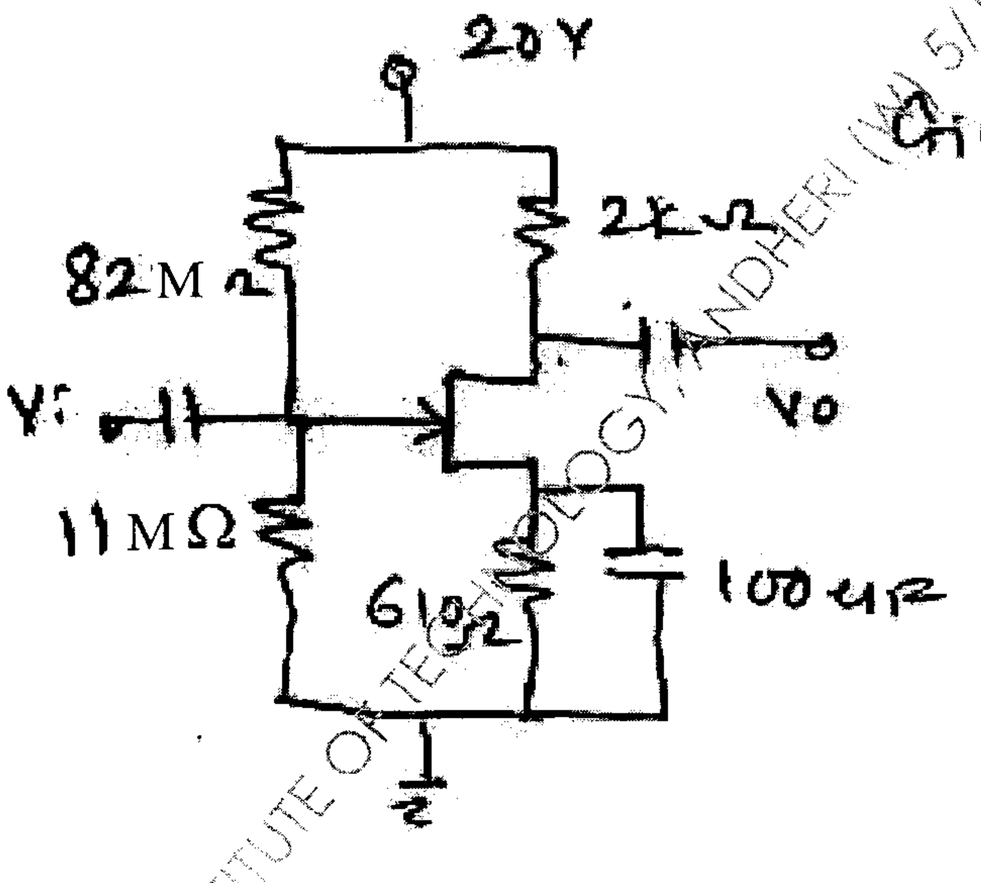
2. (a) For the following circuit shown, find operating point and plot DC load line. **10**



(b) Determine A_V, Z_i and Z_o for the following circuit. **10**



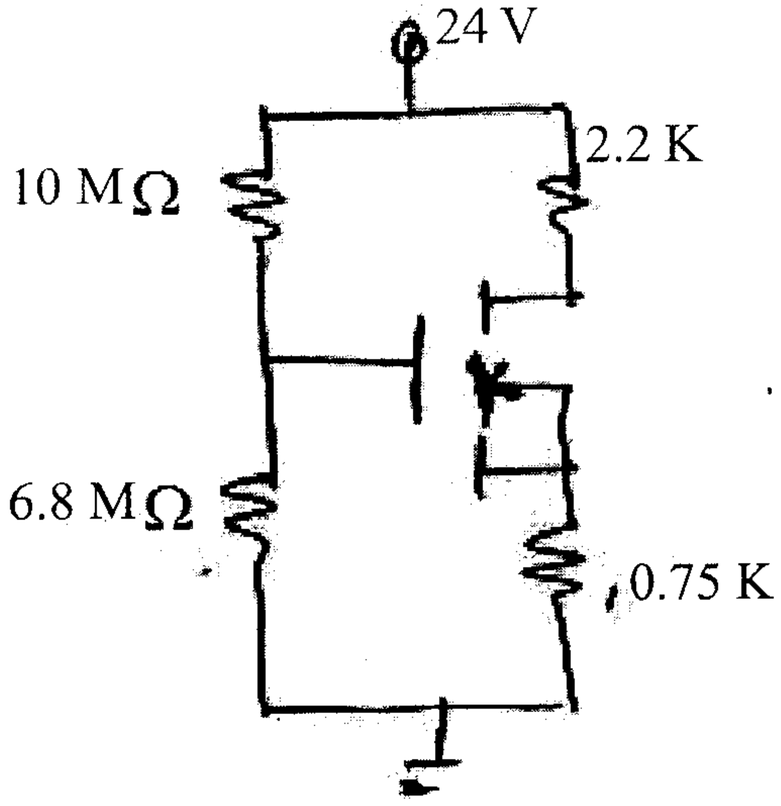
Given: $I_{DSS} = 12mA$
$V_P = -3V$
$r_d = 100k\Omega$
$g_{m_0} = 8mS$

3. (a) Derive expression for overall voltage gain. Z_i and Z_o for two stage (CS-CS) amplifier. **10**
(b) Explain advantages of negative feedback and suggest scheme for improving i/p and o/p impedance of amplifier with proper explaination **10**

QP Code : 547800

4. (a) Derive expression for Ad, AC and CMRR for dual i/p - Balanced o/p differential amplifier. **10**

   (b) For the circuit shown, find Idq, V_{GSQ}, V_D and V_S **10**



VGS (th)=3V
Id (ON) = 5mA
VGS (ON)=6V

5. (a) Explain working of class -B power amplifier, Derive expression for efficency. **10**

   (b) Explain high frequency analysis of CS amplifier. **10**

6. Write short notes on **20**
   (i) Hartley Oscillator
   (ii) Constant current Source in Differential amplifier
   (iii) Crossover distortion in class B
   (iv) Comparison of common Base and Common Emitter amplifier.

SEM - IV ETRX (CBSGS) 6/6/16

Fundamentals of Communication Engineering

QP Code : 548202

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

N.B.: (1) Question No.**1** is **Compulsory.**
(2) Attempt any **three** questions out of remaining **five** question.
(3) Assume suitable data if required.

1. Answer the following **(Any four):-**
   (a) Explain the concept of equivalent noise temperature. **5**
   (b) Explain the distortions in diode detector in AM receiver. **5**
   (c) Explain noise triangle concept in FM. **5**
   (d) Explain the sampling theorem & aliasing error. **5**
   (e) Explain the need of Modulation in analog communication. **5**

2. (a) Explain the direct and indirect method of generation of FM signal. **10**
   (b) Explain the different method of generation of SSB. **10**

3. (a) In superheterodyne receiver having no RF amplifier. the loaded Q of the antenna coupling circuit is 100. If the IF is 455kHz, calculate: **10**
      1) The image frequency and its rejection ratio for tuning at 100kHz
      2) The image frequency and its rejection ratio for tuning at 25MHz.
   (b) Explain TRF receiver with block diagram also explain TRF sensitivity and TRF selectivity characteristics. **10**

4. (a) Explain the process of quantization in PCM. Determine the signal to noise ratio at the output. **10**
   (b) "In PCM, SNR can be controlled by transmission bandwidth" Justify. Compare PCM and Delta modulation. **10**

5. (a) Explain the ratio detector with the help of circuit diagram and explain its merits. **10**
   (b) Explain PAM, PWM, PPM generation and detection. **10**

6. (a) Compare digital signal and analog signal transmission. **5**
   (b) Derive Friis formulas for noise. **5**
   (c) Explain the slope overload and granular noise in Delta modulation. **5**
   (d) Explain FDM with neat block diagram **5**

SE Sem IV (CBGS) - Electronics 31/5/16

PCS
Principles of control System

Q.P. Code : 548101

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

N.B: 1. Question No. 1 is Compulsory.
2. Attempt **any three** from the remaining questions.
3. Assume suitable data wherever necessary.
4. Figure to right indicate full marks.

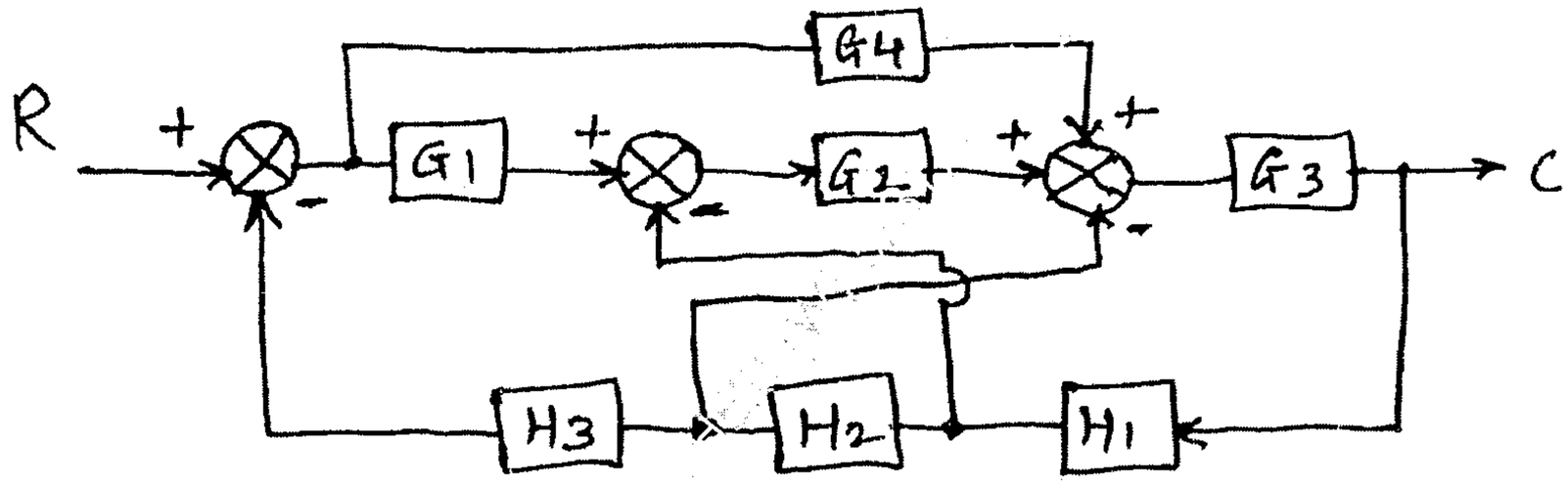
1. Attempt **any four** questions:- (20)

a) Explain Adaptive control system.
b) Explain lead and lag compensator.
c) Explain Controllability and Observability with its necessity condition for stability.
d) Determine whether the following systems are stable, marginally stable, and unstable

(i) **-2,0**; (ii) **-2+j, -2-j**; (iii) **-2+j4, -2-j4, -2**; (iv) $x(t) = \cos\omega t$; (v) $x(t) = e^{-t} \sin 4t$.

e) Examine the stability of $s^5 + 2s^4 + 2s^3 + 4s^2 + 4s + 8 = 0$ using Routh's method.

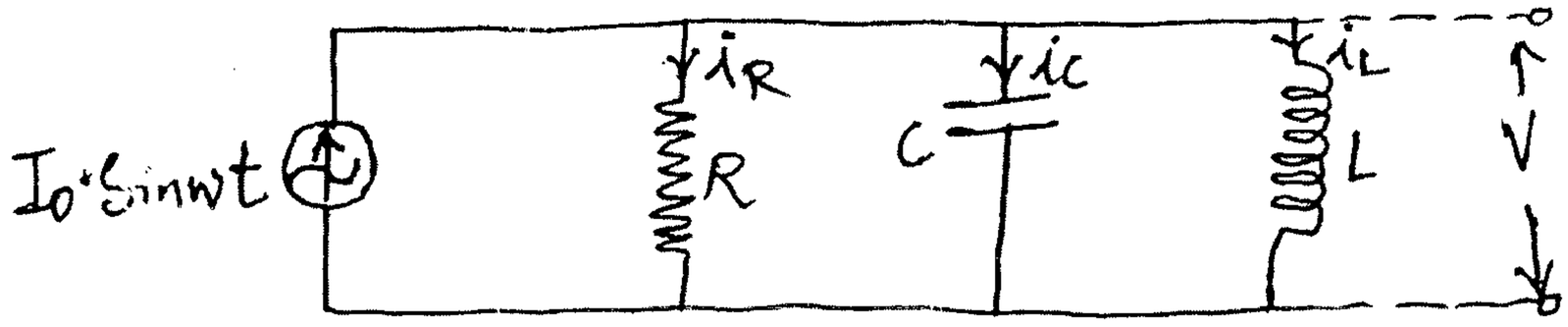
2. a) Obtain the overall transfer function from block diagram. (10)



b) Sketch the complete root locus for the system (10)

$$G(s)H(s) = [K(s+1)(s+2)] / [(s+0.1)(s-1)], \quad \text{where } K > 0.$$

3. a) Obtain the state variable model of the parallel RLC network. (10)



b) Explain P, PI and PID controller. (10)

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4. a) The state equation of a linear time-invariant system is given below: (10)

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-2 & 0\\ 1 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}0\\ 1\end{bmatrix}u$$

Where $u > 0$.

Determine the following:

(i) The state transition matrix.

(ii) Controllability of the system.

b) Sketch the bode plot for the open loop transfer function given by: (10)

$$\mathbf{G(s) = [288\,(s+4)] / [s(s+1)\,(s^2 + 4.8s + 144)]\ and\ H(s) = 1.}$$

5. a) Derive the expressions of Peak Overshoot when step input applied to the system. (05)

b) Sketch the polar plot of $\mathbf{G(s) = 12 / [s(s+1)]}$. (05)

c) For $\mathbf{G(s)H(s) = 1+4s / [s^2\,(1+s)(1+2s)]}$, draw the Nyquist plot and examine the stability of the system. (10)

6. Attempt **any two-** (20)

a) Write a short note on Robust control system.

b) Construct the signal flow graphs for the following set of equations:

$$Y_2 = G_1Y_1 - G_2Y_4$$
$$Y_3 = G_3Y_2 + G_4Y_3$$
$$Y_4 = G_5Y_1 + G_6Y_3$$

where Y_4 is the output.

Using Mason's gain formula find the transfer function of the system.

c) Explain the Correlations between time and frequency domain specifications of the system.

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SE sem IV ETRX

Electical Machines (CBGS)

Q.P. Code : 548300

(3 Hours) **| Total Marks : 60**

N.B. : (1) Question No. **1** is **compulsory**
(2) Figures to the right indicate **full** marks
(3) Solve any **three** questions out of remaining **five** questions
(4) Assume suitable data if necessary

1. Solve any **three**
   (a) Define the slip of an induction motor. Explain its significance. **5**
   (b) Explain the construction of permanent magnet synchronous motor. **5**
   (c) Draw and explain block diagram V/f control using converter-inverter scheme for 3 phase induction motor. **5**
   (d) Explain back emf equation of a dc motor. **5**

2. (a) Explain the principle of operation of capacitor start and capacitor run single phase induction motor along with slip-torque characteristics and applications. **7**
   (b) Explain construction and working of multistack variable reluctance stepper motor. **8**

3. (a) A 4 pole 3 phase 50Hz star connected induction motor has full load slip of 6% calculate full load speed of the motor. **7**
   (b) Explain double field revolving theory in single phase induction motor. **8**

4. (a) Classify the brushless DC motor and explain in detail unipolar brushless Dc motor **7**
   (b) A 800W, 115V, 60Hz capacitor start motor draws 13.8 A from the supply at rated load if the efficiency is 70% and rated speed is 1800 rpm. Calculate **8**
   (i) Input power at rated load
   (ii) Power factor at rated load
   (iii) Rated motor horse power

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S.E. sem IV CBSGS ETRX & ExTc 19-5-16

Subj:- Applied maths IV

QP Code : 545802

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

N.B.: (1) Question **No.1** is **compulsory**.

(2) Attempt **any Three** from the remaining.

1. (a) Find the extremal of the functional **5**

$$\int_0^1 [y'^2 + 12xy]dx \text{ subject to } y(0) = 0 \text{ and } y(1) = 1.$$

(b) Verify Cauchy - Schwartz inequality for u = (1,2,1) and v = (3,0,4) also find the angle between u & v . **5**

(c) If λ & X are eigen values and eigen vectors of A then prove that $\frac{1}{\lambda}$ and X are eigen values and eigen vectors of A^{-1}, provided A is non singular matrix. **5**

(d) Evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$ where $C : |z| = 2$ **5**

2. (a) Find the extremal that minimises the integral **6**

$$\int_{x_0}^{x_1} (16y^2 - y''^2)\,dx$$

(b) Find eigen values and eigen vectors of A^3 **6**

where $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$

(c) Obtain Taylor's and two distinct Laurent's expansion of $f(z) = \frac{z-1}{z^2 - 2z - 3}$ indicating the region of convergence. **8**

[TURN OVER

3. (a) Verify Cayley-Hamilton Theorem for **6**

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$ and hence find A^{-1}

(b) Using Cauchy Residue Theorem, evaluate **6**

$$\int_{-\infty}^{\infty} \frac{x^2 - x + 2}{x^4 + 10x^2 + 9}\, dx$$

(c) Show that a closed curve 'C' of given fixed length (perimeter) which encloses maximum area is a circle. **8**

4. (a) Find an orthonormal basis for the subspace of R^3 by appling Gram-Schmidt process where S {(1,1,1), (0,1,1) (0,0,1)}. **6**

(b) Find A^{50}, where **6**

$$A = \begin{bmatrix} 2 & 3 \\ -3 & -4 \end{bmatrix}$$

(c) Reduce the following Quadratic form into canonical form & hence find its rank, index, signature and value class where, **8**

$$Q = 3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 - 2x_2x_3 + 2x_3x_1$$

5. (a) Using the Rayleigh-Ritz method, find an approximate solution for the extremal of the functional $\int_0^1 \{xy + \frac{1}{2}y'^2\}\, dx$ subject to $y(0) = y(1) = 0$. **6**

(b) Prove that $W = \{(x,y) | x = 3y\}$ subspace of R^2. Is $W_1 = \{(a,1,1) | a \text{ in } R\}$ subspace of R^3? **6**

(c) Prove that A is diagonizable matrix. Also find diagonal form and transforming matrix where $A=\begin{bmatrix}1 & -6 & -4\\ 0 & 4 & 2\\ 0 & -6 & -3\end{bmatrix}$ **8**

6. (a) By using Cauchy Residue Theorem, evaluate $\int_0^{2\pi}\frac{\cos^2\theta}{5+4\cos\theta}\,d\theta$. **6**

(b) Evaluate $\int_C \frac{z+4}{z^2+2z+5}dz$ where $C: |z+1+i|=2$. **6**

(c) (i) Determine the function that gives shortest distance between two given points. **5**

(ii) Express any vector (a,b,c) in R^3 as a linear combination of v_1, v_2, v_3 where v_1, v_2, v_3 are in R^3 . **3**