

S.E. SEM IV (C.B.S) R.D.K.

D.E.C.

Q.P. Code :10649

[Time: 3 Hours]

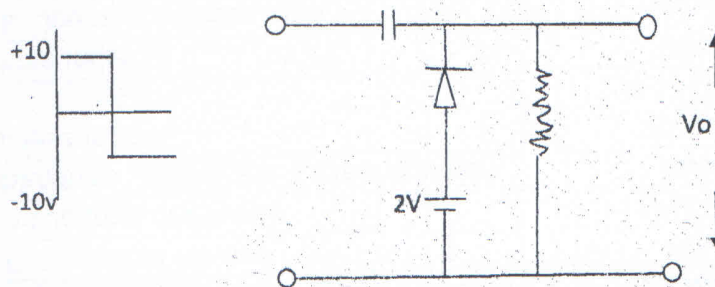
[Marks:80]

Please check whether you have got the right question paper.

- N.B:**
1. Question no1 is compulsory and solve any three questions from remaining.
  2. Draw neat and labeled diagrams.
  3. Assume suitable data if it is required.

**Q.1** Solve any five:

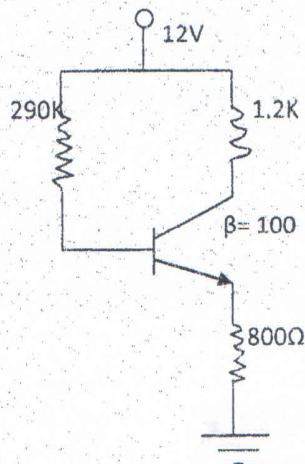
- 1) Draw the output waveform for following circuit. Identify the type. 20



- 2) Explain any one biasing circuit used for E-MOSFET.
- 3) Explain effect of coupling and by pass capacitors on frequency response of CS amplifier.
- 4) State advantages of negative feedback.
- 5) Derive expression for efficiency of Class A Transformer coupled amplifier.
- 6) Compare CS amplifier with CE amplifier.

**Q.2**

- a) For the given circuit find  $I_B$ ,  $V_{CE}$ ,  $I_{CQ}$ . 10



- b) Explain working of CS amplifier using JFET and derive formula for voltage gain,  $R_i$  and  $R_o$ . (using self bias) 10

Q. P. Code: 13589

(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)

- At reset, interrupts in 8086 processor are disabled. Give reason.
- List the differences between 8086 and 8088 processor.
- Explain 8086 flag register format and significance of each flag bit.
- Write a note on the various system bus arbitration schemes.
- Explain the significance of ALE signal and its use in 8086 based minimum system.

Q2)a) Explain the various addressing modes in 8086 using appropriate examples (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 8086 instructions having following mnemonics using examples

a) DAA      b) MUL      c) MOVSB      d) PUSH      e) JMP & JC (10)

Q4) a) Explain the need for interrupts and the interrupt structure of 8086 processor. (10)

b) Using the functional block representation explain the DMA controller 8237. (10)

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

b) Using subroutines/procedures write a program in 8086 assembly to obtain the square of an array of ten bytes (assume and state the relevant additional data required). (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 ten bytes initialized in data segment to extra segment. Assume the necessary details. (10)

(3 Hours)

[Total Marks: 80]

N.B. : 1) Question No. 1 is Compulsory.

2) Answer any THREE questions from Q.2 to Q.6.

3) Figures to the right indicate full marks.

Q.1 (a) If  $\lambda$  is eigen value of  $A$  and  $X$  is corresponding eigen vector of  $\lambda$  then show that  $\lambda^n$  is eigen value of  $A^n$  and corresponding eigen vector is  $X$  ( $n > 0$ ). (5)

(b) Evaluate  $\int_C \frac{z^2 - 2z + 4}{z^2 - 1} dz$ , where  $C$  is  $|z - 1| = 1$ . (5)

(c) Find the extremals of  $\int_{x_1}^{x_2} (1 + x^2 y) y dx$ . (5)

(d) Find a unit vector orthogonal to both  $u = (-3, 2, 1)$  and  $v = (3, 1, 5)$ . (5)

Q.2 (a) Find eigen values and eigen vectors of  $A^2 + 2I$  where  $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ . (6)

(b) Find the extremals of  $\int_{x_1}^{x_2} [(y'')^2 - y^2] dx$ . (6)

(c) Obtain Laurent's series expansion of  $f(z) = \frac{4z + 3}{z^2 - z - 6}$  at  $z = 1$ . (8)

Q.3 (a) Using Rayleigh-Ritz method find solution for the extremal of the functional  $\int_0^1 [(y')^2 - 2y - 2xy] dx$  with  $y(0) = 2$  and  $y(1) = 1$ . (6)

(b) Evaluate  $\int_0^{\infty} \frac{1}{(x^2 + 1)(x^2 + 9)} dx$ . (6)

(c) Show that matrix  $A = \begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$  diagonalizable. Also find diagonal and transforming matrix. (8)

[Turnover]

Q.4 a) Verify Cayley Hamilton Theorem for  $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$ . Also find  $A^{-1}$ . (6)

(b) Using Cauchy's Residue Theorem evaluate  $\int_0^{2\pi} \frac{d\theta}{3 + 2 \cos \theta}$ . (6)

(c) Show that the extremal of isoperimetric problem  $I = \int_{x_1}^{x_2} (y')^2 dx$  subject to the condition  $\int_{x_1}^{x_2} y dx = k$  is a parabola. (8)

Q.5 (a) Find  $5^A$  where  $A = \begin{bmatrix} 3 & 1 \\ 1 & 3 \end{bmatrix}$ . (6)

(b) Find an orthonormal basis for the subspace of  $R^3$  by applying Gram-Schmidt process where  $S = \{(1, 1, 1), (-1, 1, 0), (1, 2, 1)\}$  (6)

(c) Reduce the following quadratic form into canonical form and hence find its rank, index, signature and value class  
 $Q = 5x_1^2 + 26x_2^2 + 10x_3^2 + 6x_1x_2 + 4x_2x_3 + 14x_3x_1$ . (8)

Q.6 (a) State and prove Cauchy-Schwartz inequality. Hence show that for real values of  $a, b, \theta$   $(a \cos \theta + b \sin \theta)^2 \leq a^2 + b^2$ . (6)

(b) Show that any plane through origin is a subspace of  $R^3$ . (6)

(c) Find the singular value decomposition of  $A = \begin{bmatrix} 4 & 4 \\ -3 & 3 \end{bmatrix}$ . (8)

## Q.P. Code: 24863

Duration: 3 hrs.

Total marks: 60

N.B

1. Question 1 is compulsory
2. Solve any **THREE** out of the remaining 5 questions
3. Figures on the right indicate full marks
4. Assume suitable data if necessary

**Q1. Solve any THREE (15)**

- a) A 6 pole, 50Hz Induction motor has a full load speed of 950 rpm. Calculate slip.
- b) Derive emf equation of a dc motor.
- c) State the important applications of brushless DC motor
- d) Explain v/f method of speed control of 3 phase induction motor

**Q2. a) Develop equivalent circuit of a 3-phase Induction motor. (8)**

b) Explain the working of capacitor start Induction motor. (7)

**Q3. a) Describe the construction and working principle of a variable reluctance motor. (8)**

b) With neat diagram, discuss the working of a 3 point starter in a dc motor. (7)

**Q4. a) Name different types of unipolar brushless DC motor & describe any one type in detail (8)**

b) What are the advantages, disadvantages & applications of Switched reluctance motors? (7)

**Q5. a) Compare 3 phase induction motor with 3 phase synchronous motor. (7)**

b) Describe torque-slip characteristics of a three phase induction motor in 4 modes (8)

**Q6. Write short notes on (15)**

- a) Auto-transformer Starting of 3 phase induction motor
- b) Permanent magnet synchronous motor
- c) Double field revolving theory





Please check whether you have got the right question paper.

N.B: 1) Question 1 is compulsory and Solve any three from the remaining five questions

2) Assume suitable data if necessary.

3) Figures to the right indicate full marks.

- Q.1 Answer any **four** questions from the following: 20
- a) Explain the advantages and disadvantages of TRF receiver.
  - b) What is multiplexing? Compare TDM with FDM.
  - c) Discuss the need for modulation in wireless communication system.
  - d) What is AGC? Why is AGC needed in super heterodyne receivers?
  - e) Compare AM and FM.
- Q.2 a) With a neat circuit diagram and waveforms, explain the working of envelope detector. 04  
What are its merits and demerits?
- b) A sinusoidal carrier has amplitude of 10v and frequency 30 KHZ is amplitude 06  
modulated by a sinusoidal voltage of amplitude 3v and frequency 1 KHZ. Modulated voltage is developed across a 50  $\Omega$  resistance. i) Write the equation for modulated wave and draw the modulated wave indicating  $V_{max}$ ,  $V_{min}$  ii) Determine modulation Index. And calculate total power in the modulated wave iv) Draw the spectrum of modulated wave.
- c) Explain anyone type of SSB generation and detection with neat diagrams 10
- Q.3 a) With the help of a neat circuit diagram, explain the working of Foster Seeley discriminator. What is 10  
its disadvantage?
- b) With a neat block diagram ,discuss the working of Linear Delta modulation, its advantages and 10  
disadvantages.
- Q.4 a) With a neat block diagram, explain the function of each block of Super heterodyne AM receiver. 10
- b) State Sampling theorem. Explain the two sampling techniques. What is aliasing error? How is it 10  
overcome?
- Q.5 a) Explain the terms with reference to Radio receivers: Selectivity, Sensitivity, Fidelity and Double 10  
spotting
- b) Discuss the generation and demodulation of PWM signal. For a sinusoidal modulating signal, draw 10  
PPM, and PWM pulses
- Q.6 Write short notes on any **four**:
- a) FM wave generation using Armstrong method
  - b) ISB Transmission
  - c) Pre emphasis and De emphasis circuits with waveforms
  - d) Skywave Propagation
  - e) Noise triangle

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