BE
2013-14
(ATKT)

SE-Electrical
sem IV (old)
E.M.-I

04/06/2014

(OLD COURSE) QP Code : **MV-18904**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory.**
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume suitable data if necessary and justify the same.

1. Answer the following questions :- **20**
   (a) What is compensating winding and its use in D.C. Machine.
   (b) Describe the principle of energy conversion from consideration of various energies involved. Develop the model of an electromechanical energy conversion device.
   (c) Explain hysteresis and eddy current loss.
   (d) Draw and explain the phasor diagram of single phase transformer for leading power factor load.

2. (a) What is armature reaction in D.C. Machine ? State the methods to minimize armature reaction. **10**
   (b) The Hopkinson's test on two shunt machines gave the following results for full load :- **10**
   (i) Line voltage = 250 V.
   (ii) Current taken from supply system excluding field currents = 50 Amp.
   (iii) Motor armature current = 380 Amp.
   (iv) Field currents 5 Amp and 4.2 Amp.
   Calculate the efficiency of the machine working as a generator and motor. Assume armature resistance of each machine is 0.02Ω.

3. (a) Explain open circuit and short circuit test of a single phase transformer and construct the equivalent circuit. **10**
   (b) A load of 200 KW at 0.85 power factor lagging is to be shared by two transformers A and B having the same ratings and the same transformation ratio. For transformer A, the full load resistive drop is 1% and reactance drop 5% of the normal terminal voltage. For transformer B the corresponding values are 2% and 6%. Calculate the load KVA supplied by each transformer. **10**

4. (a) Derive the equation of torque for singly excited magnetic system. **10**
   (b) Draw and explain torque - arm. current, **10**
   speed - arm.current,
   speed - torque,
   Characteristics of D.C. shunt and series motor.

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5. (a) Explain with neat diagram, four point starter and its advantage over three point starter. 10
   (b) Explain back to back test on two single phase transformer. 10

6. (a) Explain the Swinburne's test with the help of neat diagram to find the efficiency of a D.C. machine. Write the disadvantages of this test. 10
   (b) A 250-volt, shunt motor has an armature current of 20 Amp. when running at 1000 rpm against full load torque. The armature resistance is 0.5Ω. What resistance must be inserted in series with the armature to reduce the speed to 500 rpm at the same torque and what will be the speed if the load torque is halved with this resistance in the circuit ? Assume the flux to remain constant throughout and neglect brush drop. 10

7. (a) Write short note on copper saving in autotransformer. Also write advantages and disadvantages of autotransformer. 10
   (b) Explain the commutation process in D.C. machines and list the methods to improve commution process. 10

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E.C.D.

29/5/14

(OLD COURSE) QP Code : MV-18867

(3 Hours) [Total Marks : 100

N.B.:

1. **Q 1 is compulsory**
2. Answer **any four** out of remaining **six** questions
3. Assumptions made should be clearly stated
4. Assume any suitable data wherever required but justify the same
5. Figures to the right indicate marks

Q.1 Answer the following (20)

(i) Show that the optimum conversion efficiency of the Class 'B' push pull amplifier is 78.5%

(ii) State the significance of CMRR and slew rate parameters with reference to op-amp

(iii)What is crossover distortion in power amplifiers?

(iv) What is the impact of cascading a CC stage at the input of a CE amplifier?

Q.2 (a) What are the different types of coupling used in JFET amplifiers? Draw the frequency response of JFET amplifiers and explain why the gain is dropping at low and high frequencies. (07)

(b) What is Darlington pair? What are its features? Derive the expression for voltage and current gain of a Darlington pair emitter follower circuit? (08)

(c) Write a short note on crystal oscillator. (05)

Q.3 Design a two stage RC coupled amplifier using BC147B transistors, with following specifications: (20)

Stage I voltage gain (Av1) = 80
Stage II voltage gain (Av1) = 120
Overall stability factor (S) <= 10
Lower Cutoff frequency (f_{low}) = 10 Hz

While designing, optimize the design for having high input impedance. Consider the loading effect of second stage on first stage. The specifications of BC147B are as given below:

h_{ie}= 4.5 Kohm $h_{re\ typ}$ = 290
h_{oe}= 30 micromho h_{re} = 2×10^{-4}
$h_{fe\ typ}$ = 330 $h_{fe\ min}$ = 240

Q.4 (a) Draw the circuit diagram of a Dual Input Unbalanced Output differential amplifier and derive the relevant AC parameters for it. (10)

(b) Describe the following application of op-amp in short. (10)

(i)Inverting DC amplifier with gain of 20 and input impedance of 10kohms

(ii)Gyrator

Q.5 (a)Draw the circuit diagram of integrator and differentiator using op-amp and derive the expressions for output voltages in both cases. (10)

(b) What are active filters? Explain the classifications of active filters with their frequency response curve. Design a first order low pass filter for a cutoff frequency of 10 kHz and passband gain of 2. (10)

Q.6 (a) Design a class A transformer coupled amplifier with output power of 3 watts, load resistance of 8 ohms. Assume transformer efficiency of 84% and supply voltage of 15 volts. Use the transistor with following specifications (15)

P_{Dmax} (at 25°C)= 30 W; V_{CEO} = 40 Volts; I_{Cmax} (at 25°C) = 5Amps; V_{CEsat} = 1.0volt

(b) For the above design calculate the power dissipation in the transistor when delivering half the power output and also its efficiency. (05)

Q.7 (a) Compare the performance of RC oscillators with LC oscillators. Describe a Wien Bridge oscillator with the help of suitable schematic. (10)

(b) Draw the neat diagram of an UJT relaxation oscillator. Explain its operation. Derive the expression for frequency of output signal. Draw various waveforms. (10)

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ADEC

(OLD COURSE) **QP Code : MV-18944**

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No.1** is **compulsory.**
(2) **Attempt** any **four** out of remaining **six** questions.
(3) **Assume** suitable data whenever **necessary.**
(4) **Figures** to the **right** indicate **full marks.**

1. (a) Draw and explain TTL Nand Gate and explain the operation. Draw truth table. **10**
(b) Explain the terms:— **10**
(i) CMRR (ii) Slew rate
(iii) Fan in (iv) Fan out

2. (a) Convert from BCD to Hexadecimal - **6**
(i) 402 (ii) 83
(b) Determine equivalent decimal number for the following octal numbers. **6**
(i) 732 (ii) 0.123
(c) Implement the following using 2 input NOR gates - **8**
(i) $Y = \overline{A}B + \overline{B}C$
(ii) $Z = A \oplus B$

3. (a) Using Quine MC-clusky method, minimize the boolean expression :— **10**
$F(ABCD) = \Sigma m(1, 3, 5, 8, 9, 11, 15) + d(2, 13)$
(b) Simpling using Boolean Algebra :— **10**
(i) $[(C+\overline{C}D)(C+\overline{C}\,\overline{D})]\ [(AB+\overline{A}\,\overline{B}+A\oplus B)]$
(ii) $\overline{A}BC+A\overline{B}C+AB\overline{C}+ABC$

4. (a) Convert (i) SR flip flop to JK flip flop **10**
(ii) JK flip flop to T flip flop.
(b) Implement the following SOP expression using NAND gate only :— **10**
$f(ABCD) = \Sigma m(0, 2, 6, 7, 8, 10, 11, 14)$

5. (a) Design a 3-bit twisted Ring counter using SR flip flop. Counter designed should be lockout free. **10**
(b) Design a logic diagram for 2-bit parallel in serial-out Resister and explain the operation. **10**

6. (a) Draw and explain MOSRAM cell. Explain any one programming mechanism in detail. **10**
(b) Explain the IC 0808 [ADC] in detail. **10**

7. Write short notes on [Any **three**] **20**
(1) Master slave JK flip-flop
(2) IC-723
(3) Monostable multivibrator IC 555
(4) Hamming codes
(5) The ULM or multiplexer.

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EPS

(OLD COURSE) QP Code : **MV-18975**

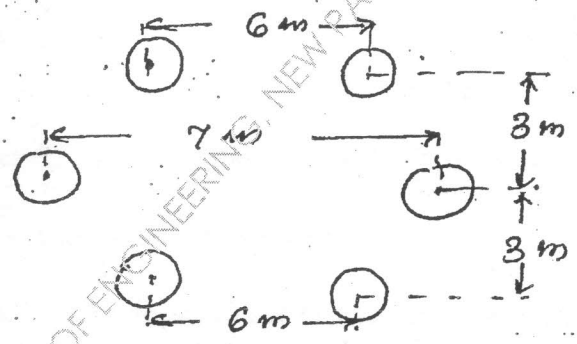
(3 Hours) [**Total Marks : 100**

N.B. : (1) Question **No.1** is **compulsory.**
(2) **Answer** any **Four** from remaining **six.**
(3) **Figures** to the right indicate **full marks.**

1. (a) State the advantages of high voltage transmission. 3
(b) What is the meaning of insulation failure? 3
(c) Explain skin effect. 3
(d) What is the significance of 'Bundled conductors' in overhead transmission line? 3
(e) State the factors affecting soil resistivity. 2
(f) Explain surge impedance loading. 2
(g) What is dielectric loss in cables? 2
(h) Explain 'Sag' in overhead transmission line. 2

2. (a) Compare overhead and underground system. 10
(b) Derive an expression for inductance of 3-Φ line with unsymmetrical spacing. 10

3. (a) Find capacitance per phase per km for double circuit 3-Φ line shown below. The conductor radius is 0.9cm. 10



(b) (i) Explain significance of transposition of transmission line. 5
(ii) Explain Ferranti effect in transmission line. Derive an expression for voltage rise in case of an unloaded transmission line. 5

4 (a) Draw and explain nominal T-model of transmission line. Draw phasor diagram and derive expression for sending end voltage and sending end current. 10

(b) A 100 km 3-Φ overhead line has resistance of 50Ω per phase, inductive reactance of 100 Ω per phase and capacitance (line to neutral) 10 nF/km. It supplies a load of 15MW at a voltage of 66 kV and power factor 0.85 lag. Using nominal π-circuit, find sending end voltage, current, power factor and regulation. 10

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EII

(OLD COURSE)

QP Code : **MV-18828**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** from the remaining **six** questions.
(3) **Figure** on **right** indicate **full** mark.

1. Solve any **four** of the following :– **20**
   (a) Why is delay line included in CRO?
   (b) Explain Piezoelectric transducer for pressure measurement?
   (c) What are advantages of Digital voltmeter over conventional analog voltmeter?
   (d) Draw the various input and output component symbols of PLC?
   (e) What are requirements of good laboratory type signal generator?

2. (a) Explain with block diagram working of function generator. **10**
   (b) What is chopper stabilized amplifier? Explain working of it with proper diagrams and waveforms at various points. **10**

3. (a) Draw block diagram of SCADA system. Hence explain function of each block. **10**
   (b) Differentiate between Analog and Digital Oscilloscope. **10**

4. (a) What are the different flow measurement techniques. Hence explain Electro-magnetic flowmeters. **10**
   (b) Explain with block diagram working of Digital Multimeter. **10**

5. (a) Explain construction and working of LVDT. Hence write advantages and disadvantage of LVDT. **10**
   (b) Discuss impedance measurement using Q-meter. **10**

6. (a) List the temperature transducer. Hence explain any two in details. **10**
   (b) What are important features of instrumentation amplifier? Explain three OPAMP instrumentation amplifier with proper derivation? **10**

7. Write short notes on (any **two**) :– **20**
   (a) Digital Tachometer
   (b) Generalized Data Acquisition System
   (c) AF signal Generator
   (d) Strain Gauge.

EE- Sem IV

A.M. – IV

(OLD COURSE) QP Code : **MV-18795**

(3 Hours) **[Total Marks :100**

N.B. (1) Question no. **1** is **compulsory.** Attempt any **four** questions from **Q.2 to Q.7.**
(2) **Figures** to the **right** indicate **full** marks.
(3) **Use** of **statistical** tables is **permitted.**

1. (a) Find values of a, b and c if
$\overline{F} = (x + 2y + az)\,i + (bx - 3y - z)\,j + (4x + cy + z)\,k$ is irrotational. **5**

(b) If $A = \begin{bmatrix} 2 & 4 \\ 0 & 3 \end{bmatrix}$ find eigenvalues and vectors of $6A^{-1} + A^3 + 2I$. **5**

(c) X is a continuous random variable with probability density function
$f(x) = k\,x\,(1 - x)\,;\ 0 \le x \le 1$. Find k and mean value. **5**

(d) Two lines of regression are given by $6y = 5x + 90$; $15x = 8y + 130$ Find $\bar{x}, \bar{y}$ and coefficient of correlation. **5**

2. (a) Prove that vector field
$\overline{F} = (y\,Sinz - Sinx)\,i + (xSinz + 2\,yz)\,j + (xyCosz + y^2)\,k$ is irrotational and find its scalar potential. **6**

(b) Reduce to normal form and find rank of $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ **6**

(c) Obtain mean and variance of Binomial distribution. When do we use Binomial distribution? **8**

3. (a) Find eigenvalues and eigen vectors of $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ **6**

(b) Using Green's theorem evaluate $\int_C \frac{1}{y}\,dx + \frac{1}{x}\,dy$ where C is the boundary of the region defined by $x = 1, x = 4, y = 1, y = \sqrt{x}$ **6**

(c) When do we use Poisson distribution ? Fit a Poisson distribution to the following data. **8**

X :	0	1	2	3	4
f :	123	59	14	3	1

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4. (a) A manufacturer knows from his experience that resistance of resistors he produces is normally distributed with mean = 100 and standard deviation = 2 ohms. What percentage of resistors will have resistance between 98 to 102 ohms ? **6**

(b) If $A=\begin{bmatrix}2 & 1\\ 1 & 2\end{bmatrix}$ find A^{50}. **6**

(c) Verify Stroke's theorem for $\overline{F} = yzi + zxj + xyk$ where C is the boundary of the region given by $x^2 + y^2 + z^2 = 1$ and $z = 0$. **8**

5. (a) Test whether $A=\begin{bmatrix}5 & -6 & -6\\ -1 & 4 & 2\\ 3 & -6 & -4\end{bmatrix}$ is derogatory or not. Justify your answer. **6**

(b) Verify Cayley-Hamilton theorem and find A^{-1} where **6**

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

(c) What is rank correlation ?Obtain spearmann's rank correlation coefficient for the following data. **8**

X :	10	12	18	18	15	40
y :	12	18	25	25	50	25

6. (a) Evaluate $\iint \overline{F}.\hat{N}ds$ over the surface S of the cube bounded by the planes $x = 0, y = 0, z = 0, x = 1, y = 1, z = 1$ where $\overline{F} = 4xzi - y^2j + yzk$. **6**

(b) Prove that every square matrix A can be uniquely expressed as sum of a hermitian and a skew hermitian matrix. **6**

(c) Examine the following system for consistency and solve if it is consistent: **8**
$2x - 3y + 7z = 5; 3x + y - 3z = 13; 2x + 19y - 47z = 32.$

7. (a) In a distribution exactly normal, 7% of the items are under 35 and 89% are under 63. Find mean and standard deviation of the distribution. **6**

(b) Find work done in moving a particle from A (1,0,1) to B (2,1,2) along straight line AB in the force field $\overline{F} = x^2i + (x - y)j + (y + z)k$. **6**

(c) Using congruent transformations reduce **8**
$Q = 6x^2 + 3y^2 + 14z^2 + 4xy + 18xz + 4yz$ to diagonal form. Find rank, index, signature and value class of Q.
