Electrical Engg.
TE-Sem V (Rev)
P.S.A.

27/5/14

2013-14
(ATKT)

QP Code : **MV-18479**

(3 hours) [Total Marks : 100

N.B.: (1) Question no. **1 compulsory.**
(2) Solve any **four** questions out of **remaining.**
(3) Assume the **suitable** data if required and specify the **same.**

1. Answer the following questions :–
   (a) Discuss the role of ground wire in protection. 5
   (b) Discuss the phenomenon of attenuation due to corona. 5
   (c) Discuss the various factors to be considered while selecting a rating of a lightning arrestor. 5
   (d) Discuss the power invariance in symmetrical components 5

2. (a) Discuss the P-V Nose Curves. 10
   (b) An alternator and a synchronous motor each rated for 50 MVA, 13·2 KV having subtransient reactance of 20%, are connected through a transmission link of reactance 10%, on the base of machine rating. The motor acts as a load of 30 MW. 0·8 PF lead and terminal voltage 12·5 KV, when a three phase fault takes place the motor terminals. Determine the subtransient current in alternator, motor and fault. 10

3. (a) Discuss the maximum charge condition. 10
   (b) A wave of 110 KV is travelling on a line of impedence 600 ohms arrives at a junction with two lines of impedences of 800 and 200 ohms respectively. Find surge voltage and currents transmittedinto each branch of line. 10

4. (a) Determine the corona critical disruption voltage, visual critical voltage, power loss in fair weather and bad weather condition for a 3 phase line 160 km long, with conductor diameter 1·036 cm, 2·44 m delta spacing, air temperature 26·67 centigrade, altitude 2440 m, corresponding to an approximate barometric pressure of 73·15 cm operating voltage 110 KV at 50 HZ. Assume m = 0·85, m_v = 0·72. 10
   (b) Discuss the phase shift of symmetrical components in star delat transformer. 10

5. (a) Discuss volt Time characteristics curve for insulation cordination. 10
   (b) Write an algorithm for short circuit study of a system. 10

6. (a) Discuss the role of surge capacitor, surge reactor and surge absorber. 10
   (b) Discuss the various causes of over voltages in power system. 10

7. (a) Draw a sequence network for double line to ground fault and line to line fault and write the fault current equation. 10
   (b) The line to ground voltages on the high voltage side of a step up transformer are 100 KV, 33 KV, and 38 KV on phases a, b and c respectively. The voltage of phase a leads that of phase b by 100 and lags that of phase c by 176·5. Determine analytically the symmetrical components of voltage. 10

Con. 11720-14.

T.E. E.E - Sem-V 06/08/2014

P.E

QP Code : **MV-18560**

(3 Hours) [Total Marks : 100

N. B. : (1) Question **No. 1** is **compulsory.**
(2) Solve **any four** questions out of remaining **six** questions.
(3) Each question is for **20 marks.**
(4) Assume suitable data if necessary.

1. Solve any **four**: 20
   (a) Write short note on thyristors family.
   (b) Explain the principle of operation of power MOSFET.
   (c) Explain the principle of operation of single phase cyclo-converter.
   (d) State and explain the application of controlled rectifier and Inverter.
   (e) Explain the principle of ON OFF control of AC voltage controller.

2. (a) Explain steady state characteristics of IGBT in details. 10
   (b) Explain static (v/i) & dynamic characteristics (turn-on and turn-off) of SCR. 10

3. (a) Explain in detail the different methods of 'turning-on' SCR. 10
   (b) A 1 phase full wave controlled rectifier has a RL load having L = 6.5 mH, R=0.5 Ω. The input voltage is V_s = 120 V(rms), 60 Hz. 10
   Determine:
   (i) the load current I_{L0} at wt = α = 60°,
   (ii) the average thyristors current,
   (iii) the rms thyristors current,
   (iv) the rms output current,
   (v) the average output current,

4. (a) Explain with circuit diagram and waveforms, a single phase dual converter. 10
   (b) Give methods to achieve harmonic reduction in case of inverters. 10

5. (a) Explain with circuit diagram and waveforms, 3 phase bridge inverter for 120° conduction mode. 10
   (b) A single phase bridge inverter has a resistive load of R = 2.4 Ω and the dc input voltage is V_s = 48 V. Determine 10
   (i) the rms output voltage at the fundamental frequency V_{01},
   (ii) the output power P_0,
   (iii) The average and peak current of each transistor,
   (iv) the peak reverse blocking voltage V_{BR} of each transistor.

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6. (a) Explain with circuit diagram and waveforms the step-up converter with RL load. 10

(b) A buck regulator has an input voltage of V_s = 12 V. The required average output voltage is V_o = 5 V at R = 500 Ω and peak to peak ripple current of inductor is limited to 0.8 A. 10

Determine

(i) the duty cycle k,

(ii) the filter inductor L,

(iii) the filter capacitor C.

7. (a) Explain in detail with circuit diagram and waveforms, single phase cyclo-converter. 10

(b) Write short note on protection of SCR. 10

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T.E. EE-Sem-V 02/06/14

C.E.

QP Code : MV-18517

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

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

1. (a) Explain with examples any two properties of Fourier transform. **20**
(b) Explain, need for modulation for long distance trammission.
(c) Pre-emphasis and De-emphasis circuits and its requirement in FM.
(d) How Power saving and Band width saving is achieved in SSB-SC system ?

2. (a) For given encoder $g_1 = 101$ and $g_2 = 111$ **10**
Determine :–
(i) Draw encoder
(ii) Draw encoder output produced by message sequence 101
(iii) Draw state diagram.
(b) Sketch the block diagram of PCM system with compander and explain its working. **5**
(c) What is quantization noise. **5**

3. (a) Draw block diagrams of Low level modulation and High level modulation and differentiate between the two. **10**
(b) For the given bit sequence draw ASK, FSK and PSK, waveforms showing carrier waveform also. **10**
Sequence b(t) = 1001101100.

4. (a) For a linear modulated wave the creast amplitude and the trough amplitude are 60 V and 15 V respectively. **10**
Calculate :–
(i) Percentage modulation
(ii) Modulation index
(iii) Total power in the modulated wave if carrier power before modulation is 40 W.
(iv) Power in side bands.
(b) Exxplain the circuit of Foster Sedy Discriminator with the help of a neat circuit diagram. **10**

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5. (a) Define the following :–
   (i) Entropy
   (ii) Information rate
   (iii) Channel capacity
   (iv) Sampling theorem.
   (b) Write, what is telemetry ?

6. (a) Draw and explain BPSK transmitter and receiver with the help of neat waveforms.
   (b) What is balanced modulator ? How carrier is suppressed, explain with the help of waveforms.

7. Write short notes on any **three** :–
   (a) Huffman code
   (b) Shannon-Hartley theorem
   (c) Linear Black-code
   (d) Superhytrodyne receiver
   (e) Sampling theorem.

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T.E. E.E. Sem-V

E.M. -II

QP Code : MV-18434

(3 Hours) [Total Marks :100

N.B. : (1) Question No. **1.** is **compulsory.**
(2) Solve any **four** out of remaining **six** question.
(3) Each question is for **20** marks.
(4) Assume suitable data if **necessary.**

1. (a) Draw different winding connection of 3-phase transformer. **5**
(b) Draw and explain in brief the equivalent circuit of 3-phase induction motor. **5**
(c) Explain double field revolving theory. **5**
(d) Explain capacitor start Induction motor. **5**

2. (a) Draw and explain Scott connection of transformer, mark the terminal & turns ratio and what are the application of soft connection? **10**
(b) Derive torque equation for 3-phase induction motor and hence explain toque-speed characteristics in motoring gone. **10**

3. (c) A-6-pole, 50 Hz, 3-phase induction motor running on full load develops a useful torque of 150 N.M. at rotor frequency of 1.5 Hz. Calculate shaft power out put if the mechanical torque lost in friction be 10 N.m. Determine (a) rotor cu loss (b) input to motor. (c) motor efficiency. **10**

3. (b) Explain with neat diagram cogging and drawling phenomenon in induction motor. **10**

4. (a) Draw the circle diagram of a 3-phase 6 pole 50 Hg. 400v star connected induction motor from the following data. **10**

No Load Test	:	400 V	10 A	1400 W
Crocked rotor Test	:	200 V	55 A	7000 W

The stator loss at stand sill is 60% of the total copper loss and full load current is 30 A. From the circle diagram determine.
(i) P.F. (ii) full load Slip
(iii) Output (iv) Efficiency.

(b) Explain the phenomenon of oscillating neural. **10**

5. (a) State different methods of speed control of Induction motor and explain any one in detail. **10**
(b) State the condition of parallel operation of 3-phase transformer in detail. **10**

6. (a) Two 3-phase transformer which have the same turns ratio are connected in parallel and supply total load of 800 kw. at 0.8 P.F. lagging. The rating are as follows. **10**

	Rating	P.U. Resistance	P.V. Reactuncs.
Transformer A	400 KVA	0.02	0.04
Transformer B	600 KVA	0.01	0.05

Determine the power O/P and power factor of each transformer.

(b) Explain shaded pole and split phase Induction motor. 1

7. Write short notes on:— 2

(a) Sumpner's Test

(b) Mechanical stress in 3-phase transformer

(c) High torque motor.

T.E. E.E. Sem-V

E.M. -II

QP Code : MV-18434

(3 Hours) [Total Marks :100

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(b) Draw and explain in brief the equivalent circuit of 3-phase induction motor. **5**
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TE- EE. Sem V (Rev).

EFW

15.5.14

QP Code : **MV-18395**

(3 Hours) [Total Marks : 100

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

1. Solve any **four** :- 20

(a) The linear charge density of an infinite line charge located along the axis of a cylinder of radius r is 8nc/m. The axis of the cylinder is the z axis of cylindrical coordinates. Find the electric flux crossing a part of the cylinder defined by $30° \le \phi \le 60°$ and $0 \le z \le 3.6$ m. 10

(b) A current element Idl = 0.01 $\overline{az}$ Am is oriented along z direction of cylindrical coordinates with its midpoint at the origin. Find the magnetic field intensity at (3.6 m, 56°, 5m). 20

(c) A lossy dielectric has $\mu r = 1$ and $\varepsilon r = 1$, $\sigma = 2 \times 10^{-8}$ (s/m). An electric field $\overline{E} = 200 \sin \omega t \ \overline{az}$ v/m at a certain point in the dielectric.

(i) At what frequency the conduction and displacement current densities be equal ?

(ii) At this frequency calculate the instantaneous displacement current density.

(d) In a conducting medium the magnetic field is given as $H = y^2 z \overline{ax} + 2(x+1)yz \overline{ay} - (x+1)z^2 \overline{az}$ A/M. Find the conduction current density at point (2,0,-1).

(e) Explain and prove that Electric field intensity is equal to the negetive gradient of Electric scalar potential.

2. (a) Evaluate both sides of the divergence theorem for the field $D = 2xy \overline{ax} + x^2 \overline{ay}$ c/m^2 and the rectangular parellelpiped formed by the planes x = 0 and 1, y = 0 and 2, and z = 0 and 3. 10

(b) Find Electric field intensity at any point 'P' due to an infinite plane sheet of surface charge of density ρs c/m^2 by using Coulomb's low. 10

3. (a) The y = 0 plane is the common boundary surface between two dielectric regions. The relative permissivity of region 1(y<0) is 5.3 and that of Region 2 (y > 0) is 1.8. The boundary has a surface charge with density 2.5 nc/m^2. The electric field intensity in Region 1 is $\overline{E}_1 = 450 \overline{ax} + 600 \overline{ay}$ v/m. Find the field intensity in Region 2. 10

(b) If $v = \frac{20 \sin \theta}{r^3}$ (volts) in free space, find :- 10

(i) ρv at P (r = 2, θ = 30°, φ = 0),

(ii) The total charge within the spherical shell 1 < r < 2 m.

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4. (a) An infinite long straight filament carrying a current of 3 amp is placed along z - axis. Calculate the magnetic field intensity at point P (1,2,1). **10**

   (b) Given $J=10^3 \sin\theta \, \overline{ar} \, A/m^2$ in spherical co-ordinates. Find the current crossing the spherical shell of r = 0.02 m, Where r = radius of shell. **10**

5. (a) Given that $\overline{D}=yz\,\overline{ax}+xz\,\overline{ay}+xy\,\overline{az}\,nc/m^2$. Calculate the total energy stored in region $0 \le x, y, z \le 1$. **10**

   (b) Given $\overline{H}=Hm\,e^{j(wt+\beta z)}\,\overline{ax}\,A/m$ in the free space. Find $\overline{E}$. **10**

6. (a) State and explain the origin of Maxwll's equations in point form for general case. Modify the Maxwell's equations for static and harmonically varying fields. **10**

   (b) The electric field intensity associated with a plane wave travelling in a perfect dielectric medium having $\mu = \mu 0$ is given by **10**

   $$\overline{E}=10\cos\left(6\pi\times10^7 t-0\cdot4\pi z\right)\overline{ax}\,v/m.$$

   Find the phase velocity, the permitivity of medium and associated magnetic vector $\overline{H}$. Velocity in free space = 3×10^8 m/s.

7. (a) Define Poynting vector. Derive the integral form of poynting theorem and explain each of the terms. **10**

   (b) Explain method of images and calculate induced surface charge density by method of images on a grounded conducting plate, which is placed at a distance (d) from a point charge (+Q). **10**
