Code : 1G242

R11

II B.Tech. II Semester Supplementary Examinations December. 2014

Electrical Circuits-II

(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1. a) Find Z parameters for the circuit shown in fig.1. Also check for reciprocity and symmetry.

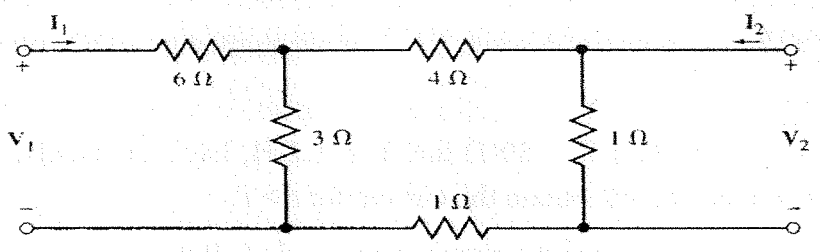


Fig .1 7M

b) Derive the expressions for ABCD parameters in terms of hybrid parameters. 7M

2. a) Obtain fundamental cutset matrix for the network shown in fig.2.

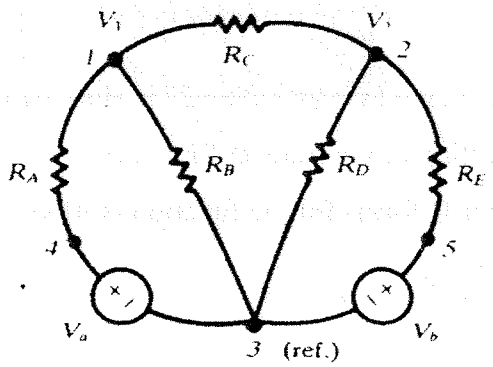


Fig.2 7M

b) Define incident matrix and reduced incident matrix using suitable examples. 7M

3. a) Explain even, odd and half wave symmetry using a relevent example. 7M

b) A voltage represented by the triangular wave shown in fig.3 is applied to a pure capacitor. Determine the resultant current.

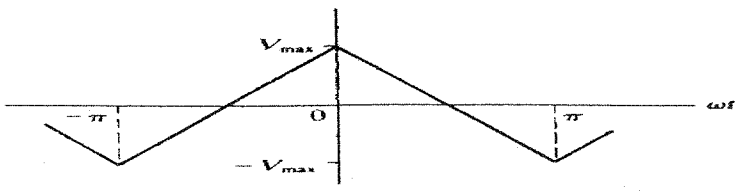


Fig.3 7M

4. a) Find the time domain current i(t), if its Laplace transform is $I(s)= (s-10)/(s^4+s^2)$. 7M

   b) State and prove initial value and final value theorems. 7M

5. a) Find $v_C(t)$ for $t > 0$ in the circuit shown in fig.5 using differntial equation approach.

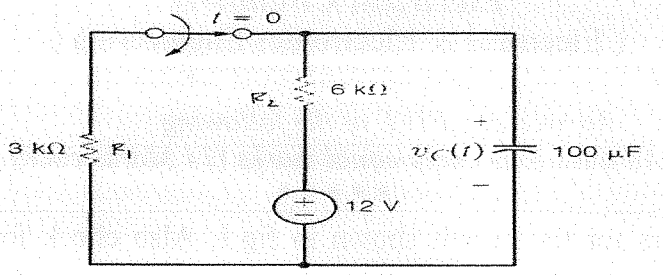


Fig.5 7M

   b) Find the transient response of a series RLC circuit excited by a DC voltage. 7M

6. a) A series RL circuit, with R = 50 Ω and L = 0.2 H, has a sinusoidal voltage v = $150sin500t$ applied at $t = 0$, obtain the current for $t > 0$. 7M

   b) Obtain the current i for $t > 0$ in the circuit shown in fig.6, if the switch is closed at $t = 0$.

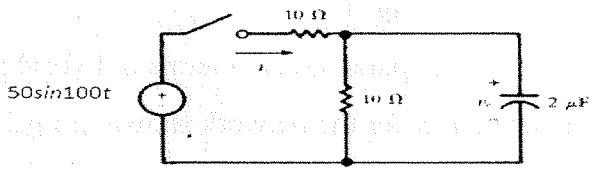


Fig.6 7M

7. a) Check the function $H(s) = s^5+3s^4+5s^3+9s^2+10s+27$ is Hurwitz or not. 7M

   b) What are the necessary conditions for a transfer function? 7M

8. Obtain the Foster I and Foster II forms for the function $(s^2+8s+12)/(s^2+4s+3)$. 14M

***

Code : 1G243

R-11

II B.Tech. II Semester Supplementary Examinations December 2014

Generation of Electric Power

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1.	a)	Explain about the growth of power systems in India	7M
	b)	Give the necessity of condenser and cooling tower in a steam power plant	7M
2.	a)	Explain the principle of operation of a gas power plant and draw the typical layout of gas power plant	7M
	b)	Give the importance of surge tank and draft tube in a hydro power station.	7M
3.	a)	Explain PWR (Pressurized water Reactor) and state its advantages and disadvantages	8M
	b)	Discuss about shielding and safety measures incorporated in Nuclear power plant	6M
4.	a)	Explain briefly about different distribution systems	7M
	b)	A 2-wire dc distributor 200 metres long is uniformly loaded with 2A/metre. Resistance of single wire is 0.3Ω/km. If the distributor is fed at one end Calculate i)the voltage drop up to a distance of 150 m from the feeding point ii)the minimum voltage drop	7M
5.	a)	What is the importance of load power factors in ac distribution systems?	4M
	b)	A single phase distributor *AB* is fed from end *A* and has a total impedance of (0.2+j0.3) ohm. At the far end, the voltage V_B=240V and the current is 100A at 0.8 p.f lagging. At the midpoint a current of 100A is tapped at p.f. of 0.6 lagging with reference to voltage V_M at the midpoint. Calculate the supply voltage V_A and the phase angle between V_A and V_B.	10M
6.	a)	What is group switching ?Explain its operation in detail with the help of a suitable diagram	7M
	b)	Compare air insulated and gas insulated substations	7M
7.	a)	Explain the terms load factor and diversity factor. How do the factors influence the cost of generation?	7M
	b)	A generating station has a maximum demand of 80MW ,a load factor of 65%,a plant capacity factor of 40% and a plant use factor of 85%.Find i)daily energy produced ii)reserve capacity of the plant iii)maximum energy that could be produced if the plant is running all the time iv) maximum energy that could be produced if the plant is running as per the operating schedule	7M
8.	a)	What are the causes and effects of low power factor?	(4+4)M
	b)	Explain the method of improving the power factor by using phase advancing equipment	6M

***

Code : 1G241

R-11

II B.Tech. II Semester Supplementary Examinations December 2014

Electrical Machines-II

(Electrical & Electronics Engineering)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Explain the operation of single phase transformer on load with phasor diagram. 6M

   b) A 1-ϕ, 50 Hz transformer has 100 turns on primary and 600 turns on the secondary winding. The net cross sectional area of the core is 350 cm^2. If the primary winding is connected to a 230 V, 50 Hz supply, determine:
   i) emf induced in the secondary winding.
   ii) The maximum value of flux density in the core. 8M

2. a) Derive the condition for maximum voltage regulation of a 1-ϕ transformer. 6M

   b) A 150 KVA distribution transformer is loaded as follows:
   i) No-load for 8 hours ii) Half full load for 6 hours iii) Full load for 4 hours iv) Quarter load for 6 hours.
   The transformer having full load efficiency of 90% and full load copper losses are equal to the constant iron losses. The p.f being 1.0, find the all day efficiency. 8M

3. a) Explain the sumpner's test of predetermination of efficiencies and regulation of transformers with neat sketch. 6M

   b) Two 220/110V transformers are operated in parallel to share a load of 250 KVA at 0.8 p.f lagging. Transformers are rated as below.
   Transformer A: 150 KVA, 0.9% resistance and 10% reactance.
   Transformer B: 100 KVA, 1.0% resistance and 5% reactance.
   Determine the load shared by each transformer. 8M

4. a) Discuss the constructional details of the three phase transformers with necessary diagrams. Mention their advantages and disadvantages of different 3-ϕ Transformers. 7M

   b) Explain the scott connection of transformers used for 3-ϕ to 2-ϕ transformation and vice versa. 7M

5. a) Explain the constructional details of 3-ϕ squirrel cage and wave wound rotor induction motors. 6M

   b) A 3-ϕ Induction motor runs at 1440 rpm at full load when supplied power from 50 Hz, 3-ϕ line. Calculate:
   i) The number of poles
   ii) Full load slip
   iii) Speed of rotor producing field w.r.t. rotor
   iv) Speed of rotor producing field w.r.t. stator. 8M

6. a) Explain crawling and cogging of 3-ϕ Induction motor. 7M

   b) Explain double cage and deep bar rotors of 3-ϕ induction machines with equivalent circuits. 7M

7. a) Explain the starting methods of 3-ϕ squirrel cage Induction motors. 6M

   b) Determine approximately the starting torque of an induction motor in terms of full load torque when started by means of (1) a star-delta switch (2) an auto transformer with 70.7% tapping. The short circuit current of the motor at normal voltage is 8 times the full load current and the full load slip is 4%. Neglect the magnetizing current. 8M

8. a) Explain the principle of operation of induction generator in detail and what are its limitations? 7M

   b) Explain the speed control method of injecting an emf into the rotor circuit of 3-ϕ induction motor. 7M

***

Code : 1G244

R11

II B.Tech. II Semester Supplementary Examinations December, 2014

Linear Control Systems

(Common to EEE & ECE)

Time: 3 hours **Max Marks: 70**

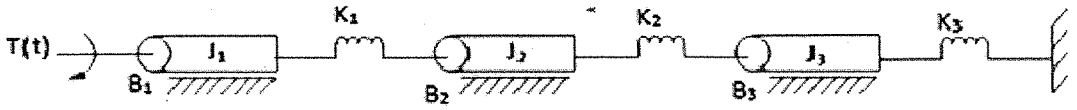
Answer any FIVE of the following

All questions carry equal marks (14 Marks each)

* * * * *

1. a) Explain the effect of feedback on transient response. 6M

   b) For the system shown below, write the differential equations of performance. Also draw the analogous electric circuit. 8M



2. a) Explain how the synchro transmitter and synchro control transformer can be used as an error detector. 7M

   b) Derive the transfer function of A.C servomotor 7M

3. a) Define the various time domain specifications. 7M

   b) Derive the expression for peak time for a standard second order system. Assume the system is under damped. 7M

4. Sketch the root locus plot for all values of K ranging from 0 to infinity for a negative feedback control system characterized by $G(s)H(s) = \frac{k(s+6)}{s(s+1)(s+2)}$. 14M

5. Using Bode plot, investigate the stability of a negative feedback control system whose open loop transfer function is given by $\frac{50}{s(1+0.5s)(1+0.05s)}$ 14M

6. Check the stability of the system by Nyquist criterion, $G(s) = \frac{10}{s^2(1+0.2s)(1+0.5s)}$ 14M

7. a) What is a lag compensator? Obtain its transfer function and draw its Pole-Zero plot. 7M

   b) Explain the different steps to be followed for the design of lag compensator using Bode plot? 7M

8. a) Derive an expression for the solution of a non-homogeneous state equation. 7M

   b) A third order system has the following coefficient matrices.

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & 0 \\ 1 & -4 & 3 \end{bmatrix}; \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}.$$ Determine the state controllability. 7M

***

Code : 1GC41 **R-11**

II B.Tech. II Semester Supplementary Examinations December 2014

Mathematics-III

(Common to EEE & ECE)

Max. Marks: 70 **Time: 03 Hours**

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

****

1. a) Show that $\int_0^\infty \frac{x^{m-1}}{(x+a)^{m+n}}dx = a^{-n}\beta(m,n)$ 7M

   b) When n is a positive integer, show that $\Gamma(n)\Gamma(n+\frac{1}{2}) = \frac{\Gamma(2n)\sqrt{\pi}}{2^{2n-1}}$ 7M

2. a) If $f(z)$ is an analytic function, show that $\left\{\frac{\partial}{\partial x}|f(z)|\right\}^2 + \left\{\frac{\partial}{\partial y}|f(z)|\right\}^2 = |f'(z)|^2$ 7M

   b) Find the analytic function $f(z)$ such that $\mathrm{Re}[f'(z)] = 3x^2 - 4y - 3y^2$ and $f(1+i) = 0$. 7M

3. a) Separate the real and imaginary parts of (i) cot z and (ii) cosec z 7M

   b) If $\tan\left(\frac{\pi}{6} + i\alpha\right) = x + iy$, prove that $x^2 + y^2 + \frac{2x}{\sqrt{3}} = 1$ 7M

4. a) Evaluate $\int_0^{1+i} (x - y + ix^2)dz$ along real axis from z = 0 to z = 1 and then along the line parallel to imaginary axis from z = 1 to z = 1 + i. 7M

   b) Evaluate $\int_C \frac{\sin^2 z}{(z-\frac{\pi}{6})^3}dz$ where C is the circle $|z| = 1$ using Cauchy integral formula. 7M

5. a) Obtain Taylor series expansion of $f(z) = \frac{e^z}{z(z+1)}$ about z = 2. 7M

   b) Find all possible regions for which the function $f(z) = \frac{7z-2}{z(z+1)(z-2)}$ has a valid Laurent series expansion about $z = -1$ and expand the function in Laurent series in the region $1 < |z + 1| < 3$ 7M

6. a) Evaluate $\int_C \frac{dz}{\sinh z}$ where C is the circle | z | = 4 using Residue theorem. 7M

   b) Using complex variable technique show that $\int_0^\infty \frac{dx}{(1+x^2)^2} = \frac{\pi}{4}$ 7M

7. a) Determine the number of roots of the equation $2z^5 - 6z^2 + z + 1 = 0$ in the region $1 \le |z| < 2$ 7M

   b) State and prove the fundamental theorem of algebra. 7M

8. a) Show that the relation $w = \frac{5-4z}{4z-2}$ transforms the circle | z | = 1 into a circle of radius unity in w – plane. 7M

   b) Find a Bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = 0, 1, \infty$. 7M

***

Code : 1G343

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)

II B.Tech. II Semester Supplementary Examinations December, 2014

Pulse & Digital Circuits

(EEE)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following
All questions carry equal marks (14 Marks each)

* * * * *

1.	a)	Explain the operation of RC Low Pass circuit for a Square input	7M
	b)	A Symmetrical square wave of amplitude ± 5v and frequency 2KHz is impressed on an RC low-pass circuit of R=5kΩ, C=0.1μf, calculate and plot steady state output response with respect to time	7M
2.	a)	Explain the applications of Voltage Comparators	7M
	b)	What is meant by d.c. Restorer and explain its operation with suitable example?	7M
3.	a)	Explain how Diode acts as a Switch	7M
	b)	What do you understand by Breakdown Voltages of Transistor, also explain with its characteristics	7M
4.		With a neat block diagram explain the operation of Fixed Bias Transistor Bi-Stable Multi-Vibrator and also mention its applications	14M
5.	a)	Derive the relationship between Slope, Displacement and Transmission errors.	7M
	b)	Explain with a neat circuit diagram, the principle of operation of Boot Strap Time Base Generator	7M
6.	a)	Explain in detail about Unidirectional Diode Sampling Gates.	7M
	b)	What is meant by principle of Synchronization?	7M
7.	a)	Explain about Synchronization of a Sweep Current with symmetrical signals	7M
	b)	What is Pedestal? How it affects the output of a Sampling Gates	7M
8.	a)	Explain the operation of TTL circuit with neat diagram	7M
	b)	Compare CMOS Logic families	7M

***