Hall Ticket Number :										

R-11/R-13

Code : 1G241

II B.Tech. II Semester Supplementary Examinations December 2015

Electrical Machines–II

(Electrical & Electronics Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Draw and explain the no-load phasor diagram for a single-phase transformer
   b) A 6600/440V single-phase 600kVA transformer has primary turns. Find: (**i**) transformer ratio (**ii**) Secondary turns (**iii**) voltage/turn (**iv**) secondary current when it supplies a load of 400kW at 0.8 power factor lagging
2. a) Distinguish between efficiency and regulation of a transformer. Show how frequency and voltage effects iron losses
   b) When a transformer is supplied at 400V, 50 Hz the hysteresis loss is found to be 300W and eddy current loss is found to be 250W. Determine the hysteresis loss and eddy current loss when the transformer is supplied at 800V, 100Hz.
3. a) The primary and secondary winding resistance of a 40kVA,6600/250V single phase transformer are 10Ω and 0.02Ω respectively. The equivalent leakage reactance as referred to the primary winding is 35Ω. Find the full load regulation for load power factors of (**i**) unity; (**ii**) 0.8 lagging; (**iii**)0.8 leading
   b) What is sumpner's test? Draw a circuit diagram to conduct this test and explain its principle.
4. a) With the help of connection and vector diagrams how a 2 phase supply can be obtained from 3 phase supply
   b) Three single phase transformers, connected in Δ-Δ, supply a balanced 3-phase load of 1200kW at 4400V at 0.8pf lagging. The transformers are supplied from 3-phase mains at 11000V. Find the currents in the windings of each transformer. If one transformer is found faulty and the other two are connected in V-V, determine the currents in the windings of each transformer.
5. a) Show that a rotating magnetic field can be produced by the use of 3 phase currents of equal magnitude
   b) A 3 phase, 400V, star connected induction has a star –connected rotor with a stator to rotor turn ratio of 6.5. the rotor resistance and stand still reactance per phase are 0.05 and 0.25Ω respectively. What should be the value of external resistance per phase to be inserted in the rotor circuit to obtain maximum
6. a) Derive an expression for the torque of an induction motor and obtain the condition for maximum torque.
   b) The rotor emf of a 3 phase, 6 pole, 400V, 50Hz induction motor alternates at 3Hz. Compute the speed and percentage slip of the motor. Find the rotor copper loss per phase if the full input to the rotor is 111.9kW.
7. Draw the circle diagram for a 400V, 5HP(3.6775kW) delta connected 3 phase induction motor from the following test results (line values)
   No Load test: 400V, 3.0A, $\cos\varphi_0$=0.2
   Short Circuit test: 200V,12.0A, $\cos\varphi_r$=0.4
8. The rotor resistance per phase of an 8-pole, 50Hz slip ring motor is 0.25Ω and its full load speed is 720rpm. Calculate the external resistance per phase that must be added to lower the speed to 600rpm given that the torque is the same in the two cases.

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Hall Ticket Number :										

R-11/R-13

Code : 1G242

II B.Tech. II Semester Supplementary Examinations December 2015

Electrical Circuits-II

(Electrical & Electronics Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Find the short circuit admittance parameters for the circuit shown in Fig.1

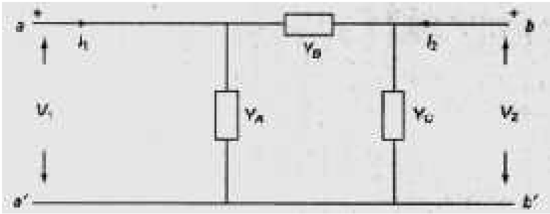


Fig.1

b) What are meant by the transmission (ABCD) parameters of a two port network? Derive the conditions necessary to be satisfied for the networks to be

(i) reciprocal and (ii) symmetrical

2. a) From the Fig.2, make the graph and find one tree. How many mesh currents are required for solving the network? Find the number of possible trees

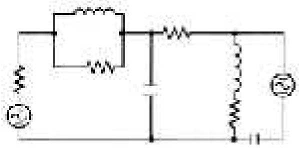


Fig.2

b) Write down the incidence matrix and cut set matrices for the network shown in Fig.3

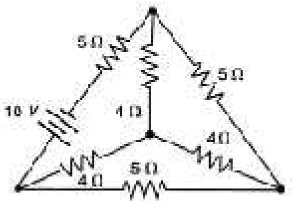


Fig.3

3. a) Find the Fourier series of the function whose periodic waveform is shown in Fig.4 and plot its frequency spectra

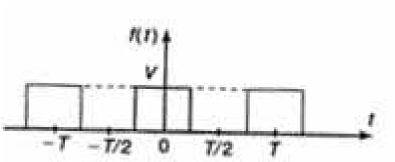


Fig.4

b) Define Fourier Transform. How does Fourier differ from i) Fourier integral and ii) Laplace Transform

4. a) Find the current i(t) in a series RLC circuit comprising resistor R=4ohms, inductor L=1 henry and capacitor C=1/3 farad when each of the following driving voltages is applied:

a) Ramp voltage 9r(t-2) b) step voltage 4u(t-3) c) impulse voltage 9δ(t-1)

b) Does every signal f(t), such f(t)=0 for t<0, have a Laplace Transform.

5. a) The switch ‘ ’ is closed sufficiently long time and then it is opened at time ‘ ’ as shown in Fig.5 Determine

$$\text{(i)}\, v_0\left(0^+\right)\ \text{(ii)}\left.\frac{dv_c(t)}{dt}\right|_{t=0^+}\ \text{(iii)}\, i_L\left(0^+\right),\ \text{and iv)}\left.\frac{di_L(t)}{dt}\right|_{t=0^+}\ \text{v)}\left.\frac{dv_0(t)}{dt}\right|_{t=0^+}$$

when $R_1 = R_2 = 3\Omega$

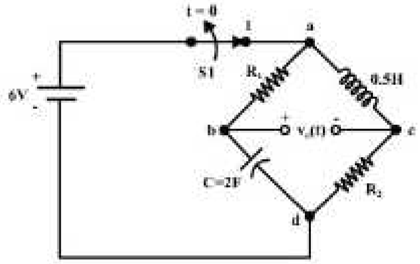
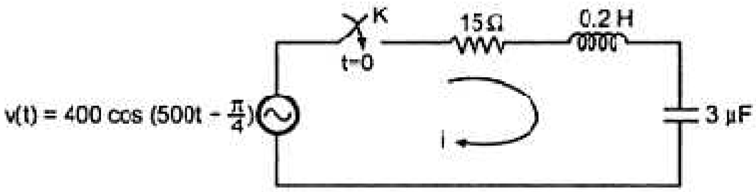


Fig.5

b) The switch ‘ ’ in the circuit of Fig. 11.7(a) was closed in position ‘1’ sufficiently long time and then kept in position ‘2’. Find $a)\, v_c(t), b)\, i_c(t), t \geq 0$

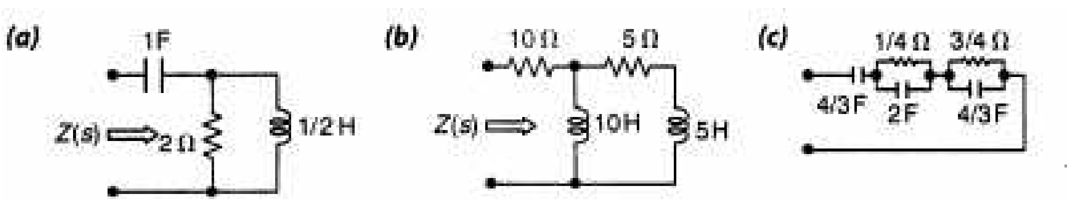
if C is i) 1/9 F ii) ¼F iii) 1/8F

6. a) In the circuit shown in Fig. determine the complete solution for the current when switch is closed at t=0. Applied voltage is given as v(t)=400cos(500t+π/4).



b) A capacitor with initial voltage V_0 is connected to resistor of RΩ at t=0, derive the expression for the voltage across the capacitor and current through the capacitor at any t>0.

7. Calculate the driving point impedance of the networks shown in Fig



8. a) Test if the following two functions are positive real functions. Give reasons.

$$\text{i)}\ Y_1(s)5\frac{s^2+2s+1}{s^2+2s^2+2s+40} \qquad \text{ii)}\ Y_2(s)=\frac{s^3+5s}{s^4+2s+1}$$

b) Enlist the necessary and sufficient conditions for a function to be positive real one

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Hall Ticket Number :										

Code : 1G243

R-11/R-13

II B.Tech. II Semester Supplementary Examinations December 2015

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)

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1. a) Discuss conventional and nonconventional energy sources and also explain the growth of power systems in India 7M

   b) Explain the function of the following in thermal power plant and explain the principle of operation of each:

   i) Economiser ii) Chimney iii) Condenser iv) Cooling tower 7M

2. a) Discuss about various types of hydroelectric plants and mention the advantages and disadvantages of each 8M

   b) Explain the principle and operation of gas power plant 6M

3. a) What are the commercial types of reactors? Explain the Fast Breeder reactor with schematic diagram? What are the advantages and disadvantages of it? 8M

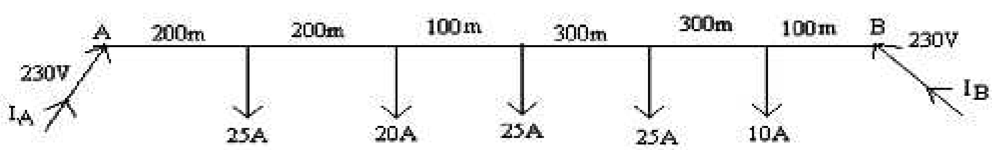
   b) Give the advantages and disadvantages of nuclear power stations with explanation 6M

4. a) Compare the performance of the following distribution systems.

   i) DC distribution Vs AC distribution

   ii) 3 phase 3 wire system and 3 phase 4 wire sytem 7M

   b) A two wire distributor is loaded as shown in figure 7b. The voltage at the two ends is 230V and 230V respectively. The distances between sections are given in meters. Determine the cross section of the conductor for a minimum consumer's voltage of 220V.



7M

5. a) How does AC distribution differ from DC distribution? 6M

   b) A 1-phase distributor has a total resistance of 0.2Ω and a reactance of 0.3 Ω.At the midpoint A, a current of 100A at 0.8 pf leading and at the far end B ,a current of 100A at 0.8 pf lagging is tapped. If the voltage at the midpoint is 200v find the voltage at the supply end when

   (i) the power factors are with respect to respective voltages at the load points

   (ii) the power factors are with respect to the voltages at the midpoint 8M

6. a) What is a substation? Classify Substations and mention the advantages and disadvantages of each 8M

   b) What is the difference between single bus bar with and without sectionalization arrangement? Explain with circuit diagrams 6M

7. a) Define the terms load factor and diversity factor and discuss their effect upon the cost of generation and design of power station. 7M

   b) A supply company offers the following alternative tariffs:

   i) Standing charges of Rs 75 per annum plus 300 paisa/kWh.

   ii) First 300 kWh at 200 paisa/kWh; and additional energy at 50 paisa /kWh.

   If the annual consumption is 1800 kWh, which tariff is more economical and by how much? 7M

8. a) What are the causes and effects of low power factor? 7M

   b) A 37.3 kW induction motor has power factor 0.9 and efficiency 0.9 at full load, power factor 0.6 and efficiency 0.7 at half-load. At no - load, the current is 25% of the full load current and power factor 0.1. Capacitors are supplied to make the line power factor 0.8 at half - load. With these capacitors in circuit, find the line power factor at

   i) full load and ii)no - load 7M

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Hall Ticket Number :										

R-11/R-13

Code : 1G244

II B.Tech. II Semester Supplementary Examinations December 2015

Linear Control Systems

(Common to EEE & ECE)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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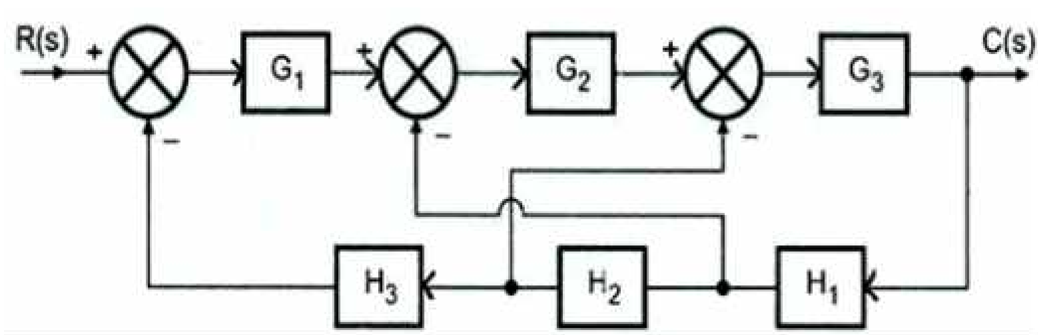
1. a) Explain the following terms:
   (i) Linear systems and nonlinear systems
   (ii) Continuous systems and discrete systems

   b) What is the sensitivity function and explain it with respect to open loop and closed loop systems?

2. a) Reduce the block diagram given in figure and hence obtain the transfer function C(s)/R(s)



   b) Derive the Transfer Function for armature controlled d.c. motor, with neat diagram and explain the advantages of armature controlled d.c. motor over field controlled d.c. motor.

3. a) Define type and order of a control system? Explain each with an example?

   b) A unity feed-back system has G(s) = 80/s(s+6) and r(t)= 4t. Determine
      i. the steady state error
      ii. the value of K, to reduce the error by 6% .

4. Sketch the root locus plot for the system having G(s) = K/(s+1); H(s) = (s+1)/(s2+4s+5)

5. a) State the effect of `transportation lag' term on Bode plots.

   b) The open loop transfer function of a unity feed back system is

   $$G(s)=\frac{Ke^{0.1s}}{s(1+s)(1+0.1s)}$$ Draw the Bode plots.

6. a) Explain how the type of a system determines the shape of polar plot.

   b) Write a note on Nyquist criterion for minimum phase & non minimum phase transfer functions

7. a) What is compensation? What are the different types of compensators? What is a lag compensator, obtain the transfer function of lag compensator and draw pole-zero plot?

   b) What is a lag compensator, obtain the transfer function of lag compensator and draw pole-zero plot?

8. a) For the given T.F T (s) = b0/S3+a2S2+a1S+a0. Obtain the state model (phase variable form)?

   b) Obtain the state model for field controlled DC Motor

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Hall Ticket Number :										

Code : 1GC41

R-11/R-13

II B.Tech. II Semester Supplementary Examinations December 2015

Mathematics-III

(Common to EEE & ECE)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Show that $(m,n) = \dfrac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. 7M

   b) Evaluate the integral in terms of gamma function $\int_0^{\text{®}/2} \sqrt{\tan{}^{\text{¯}}}\, d^{\text{¯}}$. 7M

2. a) If $w = \text{¤} + i\cdot$ represents the complex potential function for an electric field and $\cdot = x^2 - y^2 + \dfrac{x}{x^2+y^2}$ determine the function ¤ . 7M

   b) If f(z) is a regular function of z, prove that $\left(\dfrac{\partial^2}{\partial x^2} + \dfrac{\partial^2}{\partial y^2}\right)\left|f(z)\right|^2 = 4\left|f'(z)\right|^2$ 7M

3. a) Find all the roots of the equation $\sinh z = i$. 7M

   b) Separate the real and imaginary parts of $\tanh z$. 7M

4. a) Evaluate $\int_C \dfrac{e^{2z}}{(z-1)(z-2)}dz$, where C is the circle |z|=3. 7M

   b) Evaluate $\int_C \dfrac{\sin^2 z}{\left(z - \text{®}/6\right)^3}dz$, where C is the circle |z|=1. 7M

5. a) Find Taylor's series expansion of $f(z) = \dfrac{1}{(z+1)^2}$ about the point z = -i. 7M

   b) Expand $f(z) = \dfrac{1}{(z-1)(z-2)}$ in the region 0<|z-1|<1. 7M

6. a) Evaluate $\int_c \dfrac{z-3}{z^2+2z+5}dz$ where C is the circle i) |z|=1 ii) |z+1-i|=2. 7M

   b) Show that $\int_0^{2\text{®}} \dfrac{\cos 2^{\text{¯}}}{1\text{-}2a\cos{}^{\text{¯}} + a^2}\, d^{\text{¯}} = \dfrac{2\text{®}a^2}{1-a^2}, \left(a^2 < 1\right)$ 7M

7. a) If the real number $a > e$, prove, by using Rouche's theorem, that the equation $e^z = az^n$ has n roots inside the unit circle. 7M

   b) State and prove Fundamental theorem of algebra. 7M

8. a) Find the Bilinear transformation which maps the points $z = 1, i, -1$ onto the points $w = i, 0, -i$. Hence Find the image of |z|<1. 7M

   b) Show that the transformation $w = \cosh z$ maps the lines parallel to the y-axis in the z-plane into the family of ellipses in the w-plane. 7M

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Hall Ticket Number :										

Code : 1G343

R-11/R-13

II B.Tech. II Semester Supplementary Examinations December 2015

Pulse and Digital Circuits

(Electrical & Electronics Engineering)

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

Answer *any five* questions

All Questions carry equal marks (14 Marks each)

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1. a) Draw the RC high pass circuit and explain its working with step voltage input. 7M
   b) In a low pass RC circuit, R=2 kΩ and C= 1μF is applied as exponential input to this circuit determine the output wave form. 7M
2. a) For a shunt diode clipper circuit $V_i = 20\sin wt$, $V_R = 10v$ is obtained from a potential divider circuit using 100V supply and 10KΩ potentiometer i) Draw the circuit diagram. ii) If R_f = 50Ω, R_r = ∞ and $V_{¥} = 0V$, sketch the transfer characteristic, output waveform for the given V_i . 7M
   b) Explain the operation of two level slicer. 7M
3. Explain the following :
   (a) How a transistor can be used as a switch. Under what conditions a transistor is said to be “OFF” & “ON”respectively?
   (b) The phenomenon of “latching” in a transistor switch.
   (c) Switching times of transistor. 14M
4. a) With the help of a neat circuit diagram explain the working of an emitter coupled Astable multivibrator and derive an expression for the gate width. 7M
   b) Design an astable multivibrator to generate a square wave of 5 kHz frequency with a duty cycle of 25%. 7M
5. a) Draw and explain a bootstrap sweep circuit using Darlington pair. What are its merits and limitations? 7M
   b) Design free- running UJT Sweep waveform generator with the sweep amplitude of 6Volts.The sweep interval of the waveform is expected to be 3ms with negligible retrace interval. The slope error e_S=0.75.Determenine the values of R_{b1}, R_{b2},V_{BB},V,R, and C .Assume V_V=2V. 7M
6. a) Sketch and explain the operation of a unidirectional sampling gate whose output is not affected by the higher voltage level of the control input. 7M
   b) For the bi-directional diode gate Vs =20V, R_F=30Ω, R_L=R_C=100KΩ and R_2=20KΩ. Find the (V_C)min, (V_n)min, gain A and 3-dB frequency of the gate. 7M
7. a) Describe the pulse synchronization of an astable relaxation circuit with neat sketches. 7M
   b) Explain with the help of block diagram and waveforms for achieving frequency division of relaxation devices without phase jitter. 7M
8. a) Draw the circuit of 3-input OR gate which can work for :
      i) Positive logic
      ii) Negative logic use transistor on the circuit and explain its operation. 7M
   b) Discuss TTL logic with help of circuits. 7M

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