Hall Ticket Number :										

R-14

Code: 4G242

II B.Tech. II Semester Supplementary Examinations December 2017

Electrical Circuits-II

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A balanced delta connected load of $(3 + \frac{1}{j4})\Omega$ per phase is conned to 400V supply. Find line currents and phase currents using RYB frequency. 10M

   b) Prove that $V_L = \sqrt{3}\, V_{ph}$ for star connected system. 4M

OR

2. a) Prove that $\tan\Theta = \frac{\sqrt{3}\,(w_2 - w_1)}{w_2 + w_1}$ 10M

   b) Convert into Y connection

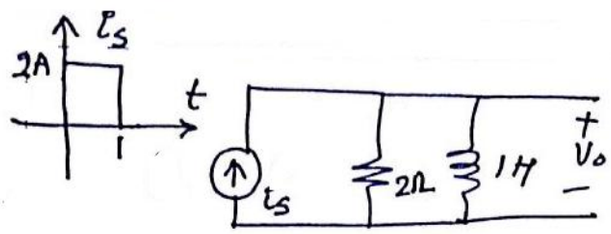
UNIT–II

3. a) $H(S) = \frac{10\,S}{S^2 + 2S + 9}$ Find $h(t)$ 7M

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

OR

4. a)

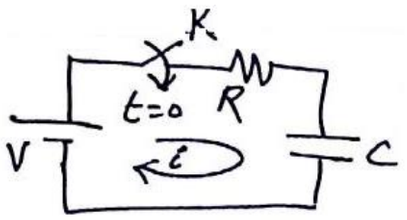


   Find $V_0(t)$ for t > 0. 7M

   b) $10\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 2y(t) = u(t)$ Find y(t) using Laplace transform.

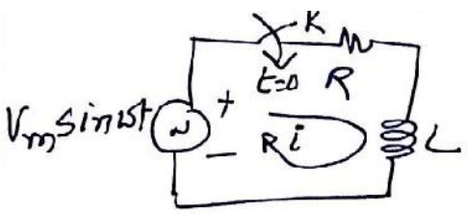
UNIT–III

5. a) Switch k closed at t=0; find i(t), $V_k(t)$, $V_c(t)$ for t > 0 and draw the wave forms.



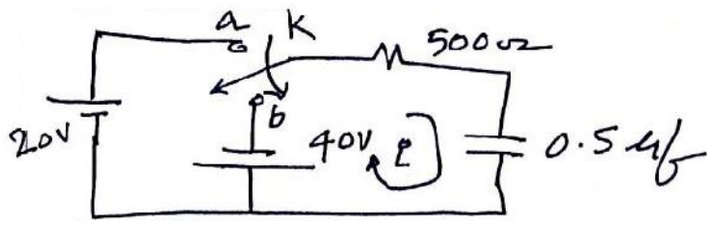
   7M

   b) Find i(t) for t > 0.



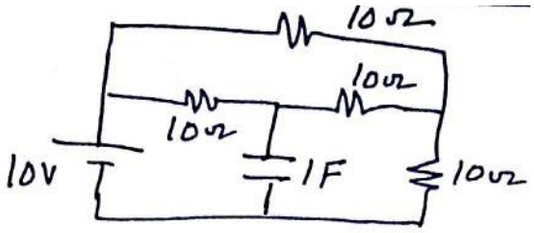
OR

6. a)



Switch 'k' is connected to a, at t=0 and moved to b after 1 time constant. The expression for i(t) for t > T 10M

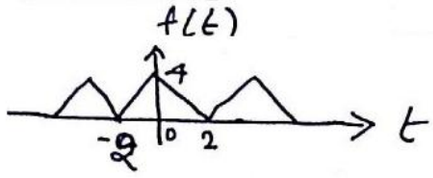
b)



Find time constant 4M

UNIT–IV

7. a)



Find exponential Fourier series and draw the spectrum. 10M

b) State and prove time convolution property using Fourier transformations 4M

OR

8. a) What is the relationship between Trigonometric and Exponential series? 4M

b) F.T. [$\sin w_0 t\, u(t)$] 10M

UNIT–V

9. a) $Z(S) = \frac{S(S^2+2)}{(S2+1)(S2+3)}$ Synthesis using foster form I & II. 10M

b) What are the properties of $Z_{RL}(S)$

OR

10. a) What are the properties of transfer function? 4M

b) What are the properties $Z(S) = \frac{S^3+2S}{S2+1}$. Implement using cauer for –II.

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Hall Ticket Number :										

R-14

Code: 4G241

II B.Tech. II Semester Supplementary Examinations December 2017

Electrical Machines-II

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Explain the construction, principle of operation of an transformer and show that $V_1/ V_2=N_1/ N_2=I_2/ I_1$ 14M

OR

2. a) Arrive at the phasor diagram of transformer when it is operating under load and explain. 7M

   b) A100KVA, 3300V/240V, 50HZ single-phase transformer has 990 turns on the primary. Identify the number of turns on secondary and the approximate value of primary and secondary full load currents. 7M

UNIT–II

3. a) What is meant by Inrush current in Transformer? Describe the nature of inrush currents and its problem during transformer charging. 7M

   b) A 500KVA Transformer has a core loss of 2200 watts and a full load copper loss of 7500 watts. If the power factor of the load is 0.90 lagging, Evaluate the full load efficiency and the KVA load at which maximum efficiency occurs. 7M

OR

4. Describe the method of calculating the regulation and efficiency of a single-phase transformer by OC and SC tests? 14M

UNIT–III

5. a) Explain the constructional details of a 3-Φ transformer and discuss its merits and demerits over three 1-Φ transformers. 7M

   b) Explain three phase transformer connections in methods. 7M

OR

6. a) Write short notes on three winding transformer. 7M

   b) With the help of connection and vector diagrams how a 2-Φ supply can be obtained from 3-Φ supply. 7M

UNIT–IV

7. a) Explain the principle of operation of three-phase induction motor. 7M

   b) Explain briefly the production of rotating magnetic field. What are the speed and direction of rotation of the field? Is the speed uniform? 7M

OR

8. a) Define torque. How it is developed in wound rotor machines? Derive an expression for the same. State the assumptions made. 14M

UNIT–V

9. a) Explain why induction motors are often described as ‘constant speed’ machines 7M

   b) What determines the direction of rotation of an induction motor? How is the direction reversed? 7M

OR

10. a) Discuss different stator side speed control methods of Induction motor in detail with suitable diagrams. 7M

    b) A 3-Φ squirrel cage induction motor has maximum torque equal to twice the full load torque. Determine the ratio of motor starting torque to its full-load torque, if it is started by (i) direct-on-line starter, (ii) star-delta starter, (iii) auto-transformer starter with 70 % tapping. The per phase rotor resistance and per phase standstill reactance referred to stator are 0.2Ω and 2Ω respectively. Neglect stator impedance. 7M

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Hall Ticket Number :										

Code: 4G243

R-14

II B.Tech. II Semester Supplementary Examinations December 2017

Generation of Electric Power

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer all five units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Briefly describe the main parts and the working of a Steam Power Station with a neat sketch? 7M

   b) Explain the functions of
   (i) economizer
   (ii) super heater in a thermal power station? 7M

OR

2. What are the factors to be considered for selection of the site for a thermal power station? 14M

UNIT–II

3. Explain the essential factors which influence the choice of site for a Hydro Electric Plant? 14M

OR

4. a) What do you mean by preventive maintenance of hydro plant? 7M

   b) Draw a neat block diagram indicating major components of gas power station and explain each block. 7M

UNIT–III

5. a) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a Nuclear Power Plant. 7M

   b) Enumerate and explain essential components of a Nuclear Reactor. 7M

OR

6. Discuss the advantages and disadvantages of a nuclear plant as compared to other conventional power plants. 14M

UNIT–IV

7. a) The daily demands of three consumers are given below: Plot the load curve and find (**i**) maximum demand of individual consumer (**ii**) load factor of individual consumer (**iii**) diversity factor and (**iv**) load factor of the station 7M

   b) Define average load, maximum demand, load factor, diversity factor, plant use factor, load duration curve? 7M

OR

8. Estimate the generating cost per kWh delivered from a generating station from the following data:

   Plant capacity = 50 MW

   Annual load factor = 40%

   Capital cost – 1.2 crores; annual cost of wages, taxation etc = Rs 4 lakhs; cost of fuel, lubrication, maintenance etc = 1.0 paise/kWh generated. Interest 5% per annum, 6 % per annum of initial value. 14M

UNIT–V

9. a) Write short notes on Photo voltaic energy conversion. 7M

   b) Explain the principle and working of MHD generator. 7M

OR

10. What are possible environmental effects as a result of an operation of an OTEC plant? 14M

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Hall Ticket Number :										

R-14

Code: 4G244

II B.Tech. II Semester Supplementary Examinations December 2017

Linear Control Systems

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Derive the transfer function of field controlled d.c servomotor. Explain the advantages of armature controlled d.c servomotor over field controlled d.c servomotor. 14M

OR

2. a) What is SFG? Write the application of SFG. State Mason's gain formula. 7M

   b) Draw the SFG for the following equations

   $x_1 - x_2 - 2x_3 - 5x_4 = 0$

   $2x_2 - 3x_3 - 5x_4 = 0$

   $7x_1 - 3x_3 - 2x_4 = 0$ 7M

UNIT–II

3. a) The open-loop transfer function of a unity feedback control system is given by $G(s) = \frac{K}{s(s+2)}$. The system is to have 25% maximum overshoot and peak time 1.0 second. Determine the value of K ? 7M

   b) Determine the error constants for standard test signals. 7M

OR

4. The overall transfer function of a control system is given by $\frac{C(s)}{R(s)} = \frac{16}{s^2 + 1.6s + 16}$. It is desired that the damping ratio to be 0.8. Determine the derivative rate feedback constant K_t and compare rise time, peak time, maximum overshoot and steady state error for unit ramp input without and with derivative feedback control. 14M

UNIT–III

5. a) Explain the absolute, relative and marginal stability. State the limitations of R-H criterion. 7M

   b) The characteristic equation of feedback control system is $s^4 + 20s^3 + 15s^2 + 2s + k = 0$. Determine the range of K for the system to be stable. Can the system be marginally stable? If so, find the required value of K and the frequency of sustained oscillation. 7M

OR

6. a) Sketch the root locus plot for the system when open loop transfer function is given by $G(s)H(s) = \frac{K}{s(s+4)(s^2+4s+13)}$. 7M

   b) Lists out the construction rules of root locus. 7M

UNIT–IV

7. Define minimum and non-minimum phase transfer function. Sketch the bode diagram for the transfer function $G(s)=\frac{1000}{(1+0.1s)(1+0.001s)}$. Determine the a) PM b) Gain margin c) Stability of the system. 14M

OR

8. a) State the definition of Type and order of the system. Sketch the polar plot for $G(s)=\frac{20}{s(s+1)(s+3)}$. 7M

   b) Define PCF and GCF. Sketch the inverse polar plot of $G(s)=\frac{1+ST}{ST}$. 7M

UNIT–V

9. A unity feedback system has an open loop transfer function

$$G(s)=\frac{K}{s(s+1)(0.2s+1)}.$$

Design a phase–lag compensation for the system to achieve the following specifications: Velocity error constant K_v= 8, phase margin =40 degrees. Also compare the cross over frequency of the uncompensated and compensated system. 14M

OR

10. a) Define Observability. Check the Observability and find its rank.

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix}=\begin{bmatrix}0 & 1 & 0\\ 0 & 0 & 1\\ 0 & -2 & -3\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}+\begin{bmatrix}0\\ 0\\ 1\end{bmatrix}=Ax+Bu$$

7M

   b) State Cayley-Hamilton. Find the f(A)= e^{At} for $A=\begin{bmatrix}0 & 1\\ -1 & -2\end{bmatrix}$. 7M

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Hall Ticket Number :										

R-14

Code: 4GC41

II B.Tech. II Semester Supplementary Examinations December 2017

Mathematics-III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) Express the integrals $\int_0^\infty x e^{-x^8} dx \cdot \int_0^\infty x^2 e^{-x^4} dx$ in terms of Gamma functions. 8M

   b) Find the principal value of $\sqrt{2i}$. 6M

OR

2. a) Show that $\int_0^{\frac{\pi}{2}} \frac{d\theta}{\sqrt{\sin\theta}} \cdot \int_0^{\frac{\pi}{2}} \sqrt{\sin\theta}\, d\theta = \pi$ 7M

   b) Find the real and imaginary parts of $\cot z$ 7M

UNIT–II

3. a) State and prove Cauchy-Riemann equations in polar form and hence deduce that $\frac{\partial^2 u}{\partial r^2} + \frac{1}{r}\frac{\partial u}{\partial r} + \frac{1}{r^2}\frac{\partial^2 u}{\partial \theta^2} = 0$ 7M

   b) Find an analytic function, whose real part is $\frac{\sin 2x}{(\cosh 2y - \cos 2x)}$ 7M

OR

4. Show that for $f(z) = \frac{2xy(x+iy)}{x^2+y^2}$ *if* $z \neq 0$ $= 0$ *if* $z = 0$ the C-R equations are satisfied at origin but derivatives of $f(z)$ at origin does not exist. 14M

UNIT–III

5. a) Evaluate, using Cauchy's integral formula $\int_c \frac{\sin\pi z^2 + \cos\pi z^2}{(z-1)(z-2)} dz$ where c is the circle $|z| = 3$ 7M

   b) Find the Taylor's expansion of $f(z) = \frac{1}{(z+1)^2}$ about the point $z = -i$ 7M

OR

6. a) Evaluate $\int_c z^2\, dz$ along the straight line from $z = 0$ to $z = 2 + i$ 7M

   b) Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in Laurent series valid for $0 < |z+1| < 2$. 7M

UNIT–IV

7. a) Find the sum of the residues of $f(z)=\dfrac{\sin z}{z\cos z}$ at its poles inside the circle $|z|=2$ 7M

   b) Use Rouche's theorem to solve $p(z)=z^9-2z^6+z^2-8z-2,\ C:|z|=1$ 7M

OR

8. a) Using Residue theorem, evaluate $\int_c \dfrac{3z^2+2}{(z-1)(z^2+9)}dz$, where C is the circle $|z-2|=2$. 7M

   b) State and prove Argument principle. 7M

UNIT–V

9. a) Discuss the transformation $w=\sin z$. 7M

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

OR

10. a) Show that $w=\dfrac{i-z}{i+z}$ maps the real axis of z-plane into the circle $|w|=1$ and the half plane $y>0$ into the interior of the unit circle $|w|=1$ in the w-plane. 7M

    b) Find the bilinear transformation which maps the points $z=1,i,-1$ onto $w=2,\ i,-2$ respectively. Find the fixed points of the transformation. 7M

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Hall Ticket Number :										

R-14

Code: 4G346

II B.Tech. II Semester Supplementary Examinations December 2017

Pulse and Digital Circuits

(Electrical and Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

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UNIT–I

1. a) A 10HZ symmetrical square wave whose peak-to-peak amplitude is 2V is impressed upon a high pass RC circuit whose lower 3 dB frequency is 5HZ. Calculate and sketch the output waveform. In particular, what is peak-to-peak output amplitude? 7M

   b) Explain how Low Pass RC network acts as ringing circuit? 7M

OR

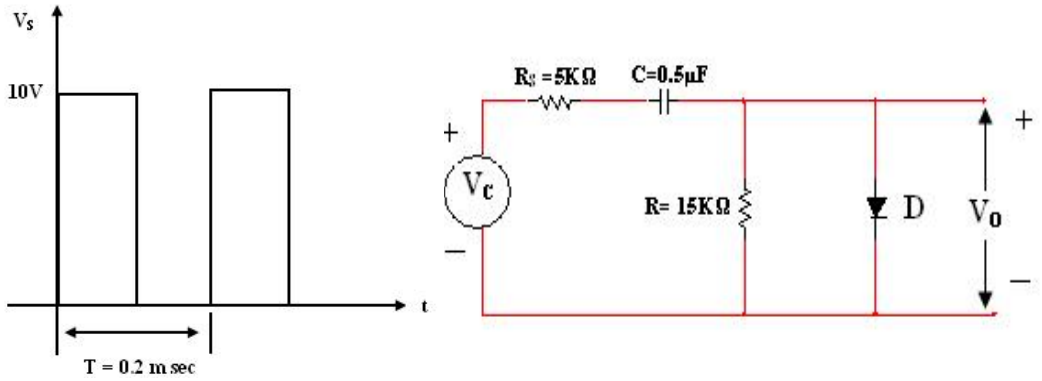
2. a) A square wave whose peak-to-peak value is 1V extends ±0.5V with respect to ground. The half period is 0.1sec, this voltage impressed upon an RC differentiating circuit whose time constant is 0.2sec. Determine the maximum and minimum values of the output voltages in the steady state. 7M

   b) What is an attenuator? Explain the under and over Compensation in attenuator 7M

UNIT–II

3. a) Define comparator and explain some applications of voltage comparators? 7M

   b) For the network shown below, draw the output wave for the first three cycles, labeling all voltage levels and time constants. For 'D' R_f=100Ω,R_0=∞,Vγ=0V .



7M

OR

4. a) Explain the two level transistor clipper circuit Derive the equation for input voltage swing. 7M

   b) Write a short note on diode switching times. 7M

UNIT–III

5. a) Design an Astable multivibrator for an output amplitude of 15V and square wave frequency of 500HZ. Assume $h_{fe\ min}$=50, Ic(sat)=5mA and V_{CE}(sat)=0V. 7M

   b) Explain about unsymmetrical triggering of Bi-stable multivibrator 7M

OR

6. a) Explain how an schmitt trigger can be used as a squaring circuit 7M

   b) What do you understand by hysteresis? What is Hysteresis voltage? Explain how hysteresis can be eliminated in a schmitt trigger 7M

UNIT–IV

7. a) Explain about the transistor boot strap time-base generation. 7M

   b) Explain about the transistor Miller time- base generator. 7M

OR

8. a) Classify the different methods of generating a time base waveform? Explain them briefly. 7M

   b) Explain the simple current sweep circuit. 7M

UNIT–V

9. a) Draw the circuit diagram of the uni directional diode gate with more than two inputs and explain its operation. 5M

   b) How do you overcome the loading effect of signal sources on control voltage? 4M

   c) Draw the circuit diagram of a Sampling Gates with more than one control voltage and explain its working. 5M

OR

10. a) Explain the positive logic AND gate and Negative logic AND gate circuit using Diode logic. 7M

    b) Classify and compare various logic families in detail. 7M

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