Hall Ticket Number :										

R-11 / R-13

Code: 1G241

II B.Tech. II Semester Supplementary Examinations May 2017

Electrical Machines-II

(Electrical & Electronics Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Explain the principle of operation of a transformer and Derive its emf equation. 10M
   b) The voltage per turn of a single phase transformer is 1.1 volt, when the primary winding is connected to a 220 volt , 50 Hz AC supply the secondary voltage is found to be 550 volt. Identify the primary and secondary turns and core area if maximum flux density is 1.1 Tesla. 4M
2. a) Develop an approximate equivalent circuit for a two winding transformer and derive the condition for zero voltage regulation. 10M
   b) A 100 KVA 1100/200v single phase transformer has the following parameters. R_1 = 1Ω, X_1= 3Ω, R_2=0.04Ω, X_2=0.012Ω. Find the equivalent resistance and leakage reactance as referred to High Voltage winding. 4M
3. a) With the help of neat circuit diagram explain Sumpners test on single phase transformers. 10M
   b) Two similar 500 KVA, single phase transformers gave the following results when tested back to back method. Mains wattmeter, W_1 = 10 KW. Primary series circuit wattmeter, W_2 = 15 KW (at full load current). Find out individual transformer efficiency at 75% full load and 0.8 power factor lead. 4M
4. a) Explain 3Φ to 2Φ Scott connection of transformers with neat circuit diagrams and Phasor diagrams. 8M
   b) Two single phase furnaces working at 100V are connected at 3300V, 3-Ø mains through Scott connected transformers. Calculate the current in each line of the 3-Ø mains when the power taken by each furnace is 400 KW at (i) a power factor of 0.8 lagging (ii) unity power factor. Neglect losses in the transformers. 6M
5. a) Explain the principle of operation of 3-phase induction motor. 6M
   b) Explain how the rotating magnetic field is produced by three-phase currents. 8M
6. a) Draw and explain the torque – slip characteristics in detail? 7M
   b) A 500V, 6-pole, 50Hz, 3-Ø induction motor develops 20KW inclusive of mechanical loss when running at 995 RPM the power factor being 0.87 calculate
   i) The rotor copper loss ii) Slip iii) The total input if the stator loss is 1500W
   iv) Line current v) The rotor current frequency. 7M
7. a) With the help of neat sketch describe the principle and working autotransformer starter of a 3 phase induction motor. 7M
   b) Explain the procedure for constructing circle diagram in detail. 7M
8. a) Explain about (i) Cascade connection of speed control (ii) V/F method of speed control of 3Φ Induction motor. 8M
   b) Write short notes on induction generator. 6M

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Hall Ticket Number :										

Code : 1G244

R-11/R-13

II B.Tech. II Semester Supplementary Examinations May 2017

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 about classification of open loop and closed loop control systems with different types of examples. 8M

   b) Write the characteristics of feed-back. 6M

2. a) Derive the transfer function of armature control DC motor. 8M

   b) Write the properties of signal flow graph. 6M

3. a) Sketch the step response of a second order system and indicate the time-domain specifications 8M

   b) Describe the three types of error constants. 6M

4. a) A characteristics equation of a feed back control system is

   $$S^5+S^4+4S^3+4S^2+2S+1$$

   check the stability of the system by using R-H Criterion 6M

   b) Sketch the root locus for the open loop transfer function of unity feed back control system is given by G(S)H(S)=K/S(S+2)(S+4) 8M

5. Sketch the Bode plot for the open loop transfer function

   G(S)=5/S(S+0.2S)(S+0.02S).

   Determine gain cross over frequency and phase cross over frequency assume H(S)=1 14M

6. Sketch the polar plot of an open loop transfer function of unity feed back control system is given by G(S)H(S)=1/S(1+S)(1+4S) and sketch the stability of the system 14M

7. Briefly explain about different types of compensation networks 14M

8. a) Write state transition matrix and its properties. 6M

   b) State and explain controllability and observability with necessary examples. 8M

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Hall Ticket Number :										

R-11 / R-13

Code: 1GC41

II B.Tech. II Semester Supplementary Examinations May 2017

Mathematics – III

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer any **Five** questions
All Questions carry equal marks (**14 Marks** each)

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1. a) Evaluate $\int_0^\infty \frac{x^c}{c^x}\,dx$. 7M

   b) Show that $\Gamma\left(\frac{1}{2}\right)=\sqrt{®}$. 7M

2. a) Show that the polar form of Cauchy's Riemann equations are $\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial ¯}$, $\frac{\partial v}{\partial r}=-\frac{1}{r}\frac{\partial u}{\partial ¯}$.

   Deduce that $\frac{\partial^2 u}{\partial r^2}+\frac{1}{r}\frac{\partial u}{\partial r}+\frac{1}{r^2}\frac{\partial^2 u}{\partial ¯^2}=0$. 7M

   b) Determine the analytic function, whose real part is $x^3-3xy^2+3x^2-3y^2+1$. 7M

3. a) Separate the real and imaginary parts of $i)\sec z \quad ii)\tanh z$. 7M

   b) Find the all roots of the equation sinhz=i. 7M

4. a) Evaluate $\int_c \frac{z^2-z+1}{z-1}\,dz$, where c is the circle (i) |z|=2 (ii)|z|=1/2. 7M

   b) State and prove Cauchy's theorem. 7M

5. a) Find Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point z=i. 7M

   b) Expand $\frac{7z-2}{(z+1)z(z-2)}$ about the point z=-1 in the region $1<|z+1|<3$. 7M

6. a) Using Residue theorem, evaluate $\int_c \frac{\sin®\,z^2+\cos®\,z^2}{(z-1)^2(z-2)}\,dz$ where c is the circle $|z|=3$. 7M

   b) Using Residue theorem, evaluate $\int_{-\infty}^{\infty} \frac{x^2dx}{(x^2+1)(x^2+4)}$. 7M

7. a) State and prove Fundamental theorem of Algebra. 7M

   b) Prove that all the roots of $z^7-5z^3+12=0$ lie between the circles $|z|=1$ and $|z|=2$. 7M

8. a) Find the image of the circle |z-2i|=2 under the transformation w=1/z . 7M

   b) Find the Bilinear transformation that maps the points (1,i,-1) into the points (2,i,-2). 7M

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Hall Ticket Number :										

Code : 1G343

R-11/R-13

II B.Tech. II Semester Supplementary Examinations May 2017

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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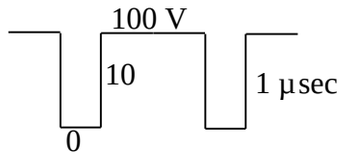
1. a) Derive an expression for the output of high pass circuit excited by exponential input? 7M

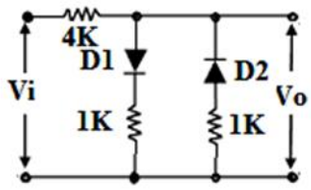
   b) The periodic wave form shown in fig is applied to an RC integrator network whose time constant is 10 µsec. Sketch the output and calculate the maximum and minimum values of output voltages with respective to ground.



7M

2. a) Explain the principle of clamping. Discuss the effect of source resistance, load resistance and cut-in voltage? 7M

   b) Draw the transfer characteristics for the circuit shown in fig and draw the output waveform for the sinusoidal input of peak to peak amplitude of 25V?



7M

3. a) Explain about the effect of temperature on transistor switching characteristics? 6M

   b) A germanium transistor is operated at room temperature in the CE configuration. Vcc=6 V, Rc=200Ω, and I_b is 20 percent higher than the minimum value required to drive the transistor into saturation. Assume the following transistor parameters: I_{CO} =5µA, I_{EO} =2µA, h_{FE} =100 and r_{bb}'=250. Find V_{BE} and V_{CE} Saturation voltages. 8M

4. a) Draw the circuit of emitter coupled Monstable Multivibrator and explain its operation? 7M

   b) Design a Schmitt trigger circuit for the following specification: UTP = 8V, LTP=5V, I_C(sat) =2mA, h_{FE}(min) =25 7M

5. a) Derive the expression for transmission error and displacement error for an exponential sweep circuit? 6M

   b) A transistor bootstrap ramp generator is to produce a 15V, 5ms output to a 2KΩ load resistor. The ramp is to be linear within 2%. Design a suitable circuit using V_{CC}=20V, V_{EE}=-20V and transistor with h_{FE}(min) = 25. The input pulse has amplitude of -5V, pulse width of 5ms and space width of 2.5ms. 8M

6. a) Explain the operation of bi-directional sampling gate using diodes. Give the equivalent circuit and derive the expressions for minimum control voltages required? 7M

   b) What is Pedestal? How does it occur in a gate circuit? 7M

7. a) Explain how the symmetrical signals are used to synchronize a sweep circuit? 6M

   b) A symmetrical Astable Multivibrator using transistor operates from 12V supply has a period of 0.5 msec. Triggering pulses of spacing 500 µsec are applied to one base through a small capacitor from a high-impedance source. Find the minimum triggering pulse amplitude required to achieve 1:1 synchronization. 8M

8. a) Compare the RTL and DTL logic families in terms of Fan out, propagation delay, power dissipated per gate and noise immunity 7M

   b) Why totem pole is used in DTL? Draw and explain a DTL gate with this. 7M

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