Hall Ticket Number :										

Code: 4G241

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Electrical Machines-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) The maximum flux density in the core of 250/3000 Volts 50 HZ single phase trans former is 1.2 Tesla. If the emf per turn is 8 volts, determine **i**) primary and secondary turns **ii**) area of the core.

   b) Draw phasor diagram of transformer. on load considering **i**) resistive load **ii**) inductive load **iii**) capacitive load

OR

2. a) Draw and explain the no-load phasor diagram of a single phase transformer.

   b) A transformer is connected to 2200 V,40 Hz supply. The core loss is 800 watts out of witch 600 watts are due to hysteresis and remaining, eddy current losses. Determine the core loss if the supply voltage and frequency are 3300V and 60 Hz respectively.

UNIT–II

3. a) A 15KVA 2000/200V transformer has an iron loss of 250W and full-load copper loss 350W. During the day it is loaded as follows:

No. of hrs.	Load	Power Factor
9	¼ Load	0.5
7	Full Load	0.8
6	¾ Load	Unity
2	No Load	---

   Calculate the Energy Efficiency.

   b) Define voltage regulation of a transformer and derive condition for **i**) zero regulation **ii**) maximum regulation.

OR

4. a) A 50KVA, 2200/110V transformer when tested gave the following results

   OC test: 400W, 10A, 110V

   SC test: 808W, 20.5A, 90V

   Find the efficiency at ¾ load at 0.707 pf lag and the regulation at 0.8pf lead

   b) Describe the tests to be done on a single-phase transformer to determine the equivalent circuit parameters.

UNIT–III

5. a) A120KVA, 6000/400V,3-Phase,50Hz,transformer has an iron loss of 1800W.The maximum efficiency occurs at ¾ th full load. Find the efficiency of the transformer at (**i**) Full load and 0.8 power factor and
   (**ii**)The maximum efficiency at UPF.
   b) Explain the scott connection of two single phase transformers?

OR

6. a) Two transformers connected in open delta, supply a 400KVA balanced load operating at 0.866 pf lagging. The voltage is 440V, what is the
   b) KVA supplied by each transformer.
   ii) KW supplied by each transformer.
   b) Write the difference between open- delta and Scot connection?

UNIT–IV

7. a) Explain the power flow diagram and torque slip characteristics of induction motor.
   b) An induction motor has an efficiency of 0.9 when delivering an output of 37KW. At this load, the stator Cu loss and rotor Cu loss each equals the stator iron loss. The mechanical losses are one third of the no load loss. Calculate the slip.

OR

8. a) Develop an equivalent circuit for three-phase induction motor. State the Difference between exact and approximate equivalent circuit.
   b) A 100kW, 330V, 50Hz, 3 phase, star connected induction motor has a synchronous speed of 500 rpm. The full load slip is 1.8% and full load power factor 0.85. Stator copper loss is 2440W, iron loss is 3500W, rotational losses is 1200W. Calculate (**i**) rotor copper loss, (**ii**) the line current and (**iii**) the full load efficiency.

UNIT–V

9. a) Comparison between 3-Ø Induction motor and 3-Ø Induction generator.
   b) Draw the circle diagram for a 440 V, 3-Φ,4-pole, 50Hz, slip-ring induction motor from the following data: No load reading: 440V, 9A, $\cos\emptyset_0$= 0.2; Blocked rotor test;110 V, 22 A, $\cos\emptyset_{sc}$=0.4; The stator and rotor copper losses are divided equally in blocked rotor test, the full load current is 20A, calculate (**i**) power factor (**ii**) output power (**iii**) efficiency (**iv**) full load slip (**v**) starting torque.

OR

10 a) A 4-pole,50 Hz, 3-Ø, 4-pole induction motor develops maximum torque at a speed of 1350 rpm. And per phase rotor resistance is 0.2 Ω. Calculate the value of external resistance that must be inserted in series with each rotor phase to produce a starting torque equal to half the maximum torque.
   b) Discuss the slip torque characteristics of Induction motor in different modes.

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Hall Ticket Number :										

Code: 4G243

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Generation of Electric Power

(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) What is the function of electrostatic precipitator used in the chimney of a thermal power station? Explain 7M

   b) Explain the fire tube boiler used in thermal power station. 7M

OR

2. a) Explain the cooling arrangement used in the thermal power station. 7M

   b) What are the different electric equipments used in the thermal power station? Explain. 7M

UNIT–II

3. a) Draw the typical layout of hydro power station and discuss its generation 8M

   b) Discuss the base load and peak load power plants 6M

OR

4. a) Briefly explain the following components of Hydropower plant:

   (i) Reservoir (**ii**) Surge tank (**iii**) Penstock 6M

   b) Explain the principle of operation of a gas turbine plant with a schematic diagram 8M

UNIT–III

5. a) Explain the radiation hazards and safety measures incorporated in nuclear power plants. 6M

   b) Explain the functions of the following in a nuclear power plant

   (i) Control Rod (**ii**) Moderator (**iii**) Reflector (**iv**) Biological shield 8M

OR

6. a) What factors are taken in to account while selecting the site for a nuclear power station and explain each factor? 5M

   b) What are the nuclear fuels and classify the nuclear reactors 5M

   c) Explain the necessity of providing shield in a nuclear power plant 4M

UNIT–IV

7. Explain the following terms as applied to power system:
(**i**) Diversity factor (**ii**) Plant capacity factor (**iii**) Load factor
(**iv**) Average load (**v**) Plant use factor (**vi**) Load duration curve and load curve (**vii**) reverse capacity of the plant 14M

OR

8. A generation station supplies the following loads: 15000kW, 12000kW, 85000kW, 60000kW and 450 kW. The station has a max demand of 22,000 kW. Calculate: **i**) Demand factor **ii**) Diversity factor **iii**) No. of units supplied annually, if the load factor is 48%. 14M

UNIT–V

9. What do you understand by electrical tariff? Discuss two part tariff, three-part tariff and power factor tariff**.** 14M

OR

10. a) A consumer has a maximum demand of 200kW at 40% load factor. If the tariff is Rs. 100 per kW of maximum demand plus 10 paise per kWh. Find the overall cost per kWh 4M

b) A generation station has a max demand of 50 MW. Calculate the cost/kwh delivered from the following data:

(i) Capital cost = Rs.95 X 105

(ii) Annual cost of fuel + oil = Rs. 9 x 105

(iii) Taxes, wages and salaries = Rs. 6 x 105

(iv) Rates of interest and deprecation is 10%. Annual load factor is 50% 10M

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Hall Ticket Number :										

Code: 4G244

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Linear Control Systems

(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) Explain the necessity and effect of feedback in control systems? 7M

   b) Write the differential equation for the mechanical system shown in figure1. Determine the transfer function.

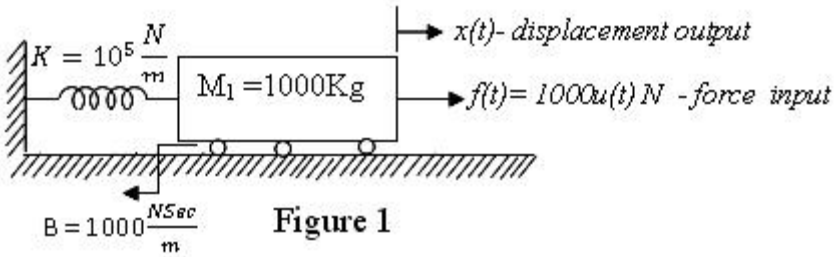

Figure 1

7M

OR

2. a) Define the transfer function and discuss the limitations in transfer function representation 6M

   b) Obtain overall transfer function C(s)/R(s) of the system shown in figure2, using block diagram reduction technique. Draw the signal flow graph for the same system and verify the result using Mason's gain formula.

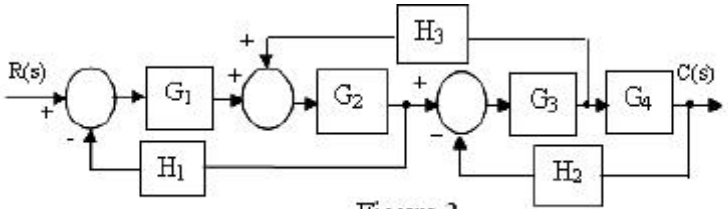

Figure 2

8M

UNIT–II

3. a) Illustrate the effect of the value of damping ratio on the location of closed loop poles of standard second order system. 6M

   b) For a unity feedback system the open loop transfer function is given by $G(s) = \frac{200}{s(s+10)}$.

   Determine: **i**) maximum overshoot **ii**) rise time **iii**) settling time and **iv**) steady state error if the input is a unit step. 8M

OR

4. a) Discuss any three of the time domain specifications. 6M

   b) The open loop transfer function of a control system with unity feedback is $G(s) = \frac{500}{s(s+0.1s)}$. Evaluate the error series for the system and determine the steady state error of the system when an input of $r(t)=1+2t+t^2$; t > is applied. 8M

UNIT–III

5. a) What is the effect of adding zeros to G(s)H(s) on the root focus. 4M

   b) Draw the complete root focus for a system with $G(s)H(s)=\frac{K(s+12)}{s^2(s+20)}$ 10M

OR

6. a) Briefly explain about Routh-Hurwitz criterion. 5M

   b) A feedback control system has loop transfer function

   $G(s)H(s)=\frac{K}{s(s+2)(s+10)}$. Sketch the root locus and determine the range of 'K' for which the system is stable. 9M

UNIT–IV

7. The open loop transfer function of a unity feedback control system is given by $G(s)=\frac{K}{s(1+0.2s)(1+0.02s)}$.

   Draw Bode plots in magnitude and phase and hence determine the following:

   i) Gain margin when K = 1.

   ii) The value of K for gain margin to be 20 dB.

   iii) The phase margin corresponding to the above value of K.

   iv) Gain margin, phase margin and corresponding frequencies for K = 10. 14M

OR

8. Using Nyquist criterion determine condition for stability for the unity feedback system having open loop transfer function $G(s)=\frac{K}{s(1+\tau_1 s)(1+\tau_2 s)}$. 14M

UNIT–V

9. a) Draw electrical network configuration for phase lag-lead compensator and hence derive the transfer function for the same. 7M

   b) Explain the design procedure for lag- lead compensation in frequency domain 7M

OR

10. a) What do you understand by state transition matrix? State and prove its properties 6M

    b) Determine the time response of the following system

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}0 & 1\\ -6 & -5\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u(t)$$

$$y(t)=\begin{bmatrix}1 & 0\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$, where $u(t)$ is the unit step and $x_1(0)=x_2(0)=0$. 8M

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Hall Ticket Number :										

Code: 4GC41

R-14

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

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) Evaluate $\int_{-\infty}^{\infty} e^{-x^2}\,dx = \sqrt{\pi}$ 7M

   b) If $\tan(x+iy)=u+iv$ then show that $u\sinh 2y = v\sin 2x$. 7M

OR

2. a) Evaluate $\int_{0}^{\frac{\pi}{2}} \sin^{\frac{7}{2}}\theta\ \cos^{\frac{3}{2}}\theta\ d\theta$. 7M

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

UNIT–II

3. a) Apply C-R conditions to $f(z)=z^3$ and show that the function is analytic everywhere. 4M

   b) If $f(z)=u+iv$ is analytic function of z and if $u-v=e^x(\cos y-\sin y)$, find $f(z)$ in terms of z. 10M

OR

4. a) Suppose $f(z)=u+iv$ is an analytic function. If $u=x(x^2-3y^2)$, find harmonic conjugate $v(x,y)$ and write the corresponding complex potential $f(z)=u+iv$. 7M

   b) If $f(z)=u+iv$ is an analytic function. Show that the family of curves defined by $u(x,y)=c\text{constant}$ cuts orthogonally the family of curves $v(x,y)=c\text{constant}$. 7M

UNIT–III

5. a) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)}dz$ where c is $|z|=3$ using Cauchy's integral formula 7M

   b) Expand the function $f(z)=\frac{z-1}{z^2}$ in a Taylor series with center $z_0=1$ then find its radius of convergence. 7M

OR

6. a) Evaluate $\int_c \frac{1}{z}dz$, where c is the circle defined by $x=\cos t, y=\sin t, 0\le t\le 2\pi$ 4M

   b) Find the Laurent's series expansion of $f(z)=\frac{1}{(z-1)(z-2)}$ for $1<|z|<2$ and hence, evaluate $\int_C f(z)\,dz$, where $C:|z|=1.5$. 10M

UNIT–IV

7. a) Determine the poles of the function $f(z)=\frac{1}{(z-1)(z-3)}$ and find the residue at each pole. 6M

   b) Evaluate the real integral $I=\int_0^{2\pi}\frac{1}{2+Cos\theta}d\theta$ using residue theorem. 8M

OR

8. a) State and Prove argument principle. 7M

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

UNIT–V

9. Consider the points $1,i,-1$ in z-plane is mapped onto the points $i,0,-i$ in w- plane under a bilinear transformation $f(z)$.

   (i) Determine the bilinear transformation $f(z)$.

   (ii) Find the image of $|z|<1$ under $f(z)$.

   (iii) Find the Invariant points of $f(z)$. 14M

OR

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

    b) Find the image of the line $x=4$ in z-plane under the transformation $w=z^2$. 7M

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Hall Ticket Number :										

R-14

Code: 4G346

II B.Tech. II Semester Supplementary Examinations Nov/Dec 2016

Pulse and Digital Circuits

(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) Derive the output and draw the response of high pass RC circuit for
   i) Step input ii) Square input 8M
   b) In an RC low-pass circuit R=2kΩ and C=1μF. A square wave with half period of 5μs is applied as input to this circuit. Determine the output waveform. 6M

OR

2. a) Explain the RC integrator with neat input and output waveforms? 7M
   b) A 10hz symmetrical square wave whose peak-to-peak amplitude is 2v is impressed upon a high pass circuit whose lower 3-db frequency is 5HZ, calculate and sketch the output waveform. In particular, what is peak-to-peak output amplitude? 7M

UNIT–II

3. a) Explain the response of the Clamping circuit when a Square wave input is applied under Steady State conditions? 7M
   b) What is meant by Piece wise linear approximation? Draw the V-I characteristics of junction diode on the basis of above approximation? 7M

OR

4. a) Discuss series and shunt clipper using diode along with relevant waveforms? 8M
   b) Explain how transistor acts as a switch? Draw the characteristics and explain? 6M

UNIT–III

5. a) Illustrate the factors that influence the stability of relaxation devices? 7M
   b) Explain about transistor Bootstrap time-base generation? 7M

OR

6. a) What are the methods of generating a time-base waveforms? 7M
   b) Discuss the differences between Miller Sweep circuit and Bootstrap Sweep circuit? 7M

UNIT–IV

7. a) With neat circuit explain the operation of Monostable Multivibrator. Also sketch waveforms and derive the pulse width? 7M
   b) Design an Astable Multivibrator to produce an unsymmetrical wave t_1=0.5ms and t_2=0.4ms. The amplitude of the square wave is 15v. Assume $h_{fe\ (min\ )}$= 20, $I_{C(sat\ )}$ = 5mA and $v_{ce\ (sat)}$ = 0v. 7M

OR

8. a) Design an Astable Multivibrator to generate a square wave of 5KHZ frequency with a duty cycle of 25%? 7M
   b) Explain the symmetrical and unsymmetrical triggering of Bi-stable Multivibrator? 7M

UNIT–V

9. a) Explain the operation of TTL circuit with neat diagram? 7M
   b) Compare CMOS logic families? 7M

OR

10. a) Draw the circuit diagram of CMOS, NOR and NAND gates and explain their operations? 7M
    b) Distinguish between Sampling gate and logic gate and give examples of each? 7M

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