Enrolment No. | | | | | | | |

S7(UEE05B11):EE

B.Tech 5th Semester, End Term Examination 2018

Subject: Power System-II

Code No:-UEE05B11

Total Marks: 100 **Time: 3 Hrs**

Figures in the margin indicate full marks for the questions.
Candidates are required to give their answers in their own words as far as practicable

Answer any five questions:

1. (a) Compare the performance and characteristics of SF6 and vacuum circuit breaker.

(b) Derive an expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance. What measures are taken to reduce them?

(c) Draw the control circuit diagram of practical circuit breakers.

(d) For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3 ohms and 0.015 μF, respectively. Calculate the (i) frequency of transient oscillation and (ii) maximum value of restriking voltage across the contacts of the circuit breaker.

6+5+5+4=20

2. (a) What is the need of power system protection.

(b) Explain with appropriate diagram the differences of CT, PT used in protection purpose and measurement purpose.

(c) The current rating of an over current relay is 5A. PSM=2, TMS=0.3, CT ratio 400/5, fault current 4000A. Determine the operating time of the relay. At TMS=1, Operating time at various PSM are:

PSM	2	4	5	8	10	20
Time in second	10	5	4	3	2.8	2.4

(d) Draw and explain directional overcurrent relay operation.

(e) Explain the principle of % differential relay for a star delta 3-phase transformer.

2+3+4+6+5=20

3. (a) Derive the swing equation of a synchronous machine swinging against an infinite bus. Clearly state assumption made in deducing the swing equation.

(b) Describe the equal area criterion for stability analysis. Find the expression of critical clearing angle for a terminal fault of a generator connected to an infinite bus.

(c) A generator transformer combination connected to an infinite bus (|V|=1.0 pu) through two parallel transmission line (reactance 0.5pu each), is delivering 1.0 pu power. Generator terminal voltage is given as $|V_t|$=1.0 pu. Transient reactance of generator and transformer are 0.25 pu and 0.1 pu respectively. Calculate the generator emf behind transient reactance. Find the maximum power that can be transferred under the following conditions (i) system healthy and (ii) one line open

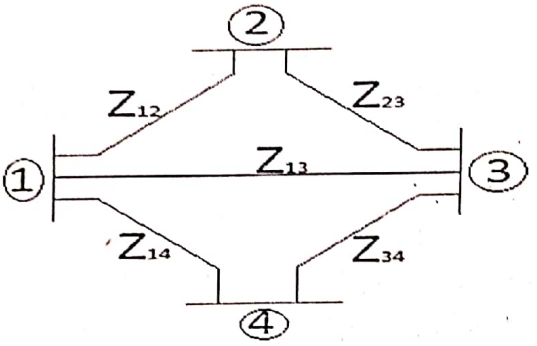
(d) How stability limit can be improved.

6+8+4+2=20

4. (a) Develop the equations for real and reactive bus powers.

(b) Determine Y_{bus} for the 4- bus system shown in figure below. The line series impedances are as follows: (Neglect the shunt capacitances of the lines). Find the modified Y_{bus} bus matrix when line 1-2 is removed.

Line (bus to bus)	Impedance (p.u.)
1 – 2	0.30 + j 1.2
1 – 3	0.25 + j 0.8
1 – 4	0.20 + j 1.4
2 – 3	0.35 + j 0.6
3 – 4	0.15 + j 0.4



(c) Describe the advantages of Y_{bus} matrix over Z_{bus} matrix. Describe different types of buses in connection with load flow analysis

6+8+3+3=20

5. (a) Show that sum of the symmetrical component powers is equal to the 3-phase power.

(b) Show that in a balanced 3-phase system only positive sequence component exists.

(c) Derive the expression of fault current for double line to ground fault of an unloaded generator and draw the sequence network for the same.

(d) A 25 MVA, 11 kV, 3-phase alternator with X_{g0}=0.05pu, X_1=0.15pu and X_2 =0.15pu is grounded through a reactance of 0.3 ohm. Calculate the line current for a single line to ground fault.

4+4+7+5=20

6. (a)Derive the equation of impedance and reactance relay from universal torque equation and draw their characteristics in R-X plane.

(b) Develop the power angle curve of a synchronous machine connected to an infinite bus.

(c) Write a comparative assessment of Gauss-Siedel and Newton- Raphson method.

(d) State different arc-quenching methods adopted in circuit breakers.

****

Enrolment No. 16UEE064

S5(UEE05B12)

B. Tech 5th Semester End Term Examinatin-2018
Microprocessors and Microcontrollers

Paper Code: UEE05B12

Full Marks: 100 Time: 3 hours

The figures in the margin indicate full marks for the questions

Answer any five questions

1. (a) Ten Hex numbers are stored in RAM location 60H onwards in 8051 µc. Write a program to find the biggest number in the set. The biggest number has to be sent in the port no. 01 H.
   (b) In a semester a student has to take 8 subjects. The marks (out of 100) are stored in RAM locations 50H onwards. Find the average marks and output it on port 2. 7+5+3+5
   (c) Convert a HEX no. to decimal no. 10+5+5

2. (a) Write down the features of 8086 µp. (b) Give a comparative study between 8085 and 8086 µp. (c) Explain the pin configuration of 8086 µp with proper diagram. 5+5+10

3. (a) WAP in 8051 to add first 10 natural numbers. (b) WAP to load the accumulator with value 50H and complement the Accumulator 500 times. (c) Ten hex numbers are stored in memory locations 60H onwards. WAP to find the biggest no in the set. The biggest number should finally be saved in 70H. (d) Write a program (WAP) in 8051 to multiply 37 by 19. 5+5+5+5

4. (a) Describe all the functional unit of 8086 µp with proper illustration. (b) Write down the interrupt mechanism in details for 8086 µp. 10

5. Q.4. (a) Describe Direct Memory Access for DSPs. (b) Prepare a comparative study between ASIC, FPGA and general processor. (c) Explain FPGA in brief with generic architecture. Explain the techniques for implementation of programmability of FPGA. 5+3+5+7

6. (a) Write down FPGA logic block variations. (b) Explain FPGA design flow. 10+10

7. Explain the followings with appropriate neat diagrams (where needed)
   i) Serial Peripheral Interfaces (SPI)
   ii) Inter Integrated Circuit (I 2 C)
   iii) RS232C
   iii) Universal Serial Bus (USB) 5×4

Enrolment No. ☐☐☐☐☐☐☐

S_5UEE05B10 EE

B.Tech. 5th Semester End Term Examination, 2018

Name of Subject: *Energy Conversion system -III*

Paper Code- UEE05B10

Full mark:-100 (Hundred). **Time-3 Hrs.**

Answer question any 5(five) questions

1.

a. Why direct axis reactance is higher than quadrature axis reactance in a salient pole synchronous machine

b. Draw the phasor diagram of a salient pole synchronous generator. Derive the expression of power output of a salient pole synchronous machine in terms of it terminal voltage, excitation emf, reactance and load angle.

c. A synchronous generator has a direct axis synchronous reactance of 0.8pu and quadrature axis reactance of 0.5pu. It is supplying full load at rated voltage at 0.8 lagging pf. Find the open circuit voltage of the machine. Neglect armature resistance.

(5+7+8=20)

2.

a. Why cylindrical rotor alternator is used with steam turbine and salient pole alternator with hydroelectric plant.

b. Draw "V Curves" of a synchronous motor at different load. Explain why the point corresponding to minimum armature current in a v curve shift toward left as the load is increased

c. A synchronous generator with a synchronous reactance of 1.3pu is connected to an infinite bus whose voltage is 1.0pu through an equivalent reactance of 0.2pu. The maximum permissible output is 1.2pu.

i. Compute the excitation voltage

ii. Power output is gradually reduced to 0.7pu with fixed field excitation as in part (i). Find the new current , power angle , and the power factor

(5+5+10=20)

3.

a. Explain why the short circuit characteristics of a synchronous machine is linear, but open circuit characteristics is nonlinear?

b. List the essential condition to be satisfied before a synchronous generator can be connected to grid.

c. A three phase star connected alternator has synchronous impedance of (0.4+j6)Ω per phase. It deliver 400A at unity power factor to 11kV bas bar. If the steam supply is unchanged, determine the percentage change in excitation to make the pf 0.8pf lagging

(5+5+10=20)

4.

a. Explain the principle of operation of a three phase synchronous motor. Draw phasor diagram of cylindrical rotor synchronous motor for leading power factor.

b. Why synchronous motors are not self-starting? Name the methods generally used to start synchronous motor and explain any one in detail.

c. Determine the rating of the synchronous condenser which will raise the pf of a substation from 0.7 lagging to 0.85lag. The substation is operating at full load of 1050kVA and power factor of 0.7 lagging.

d. A three phase star connected synchronous generator is of salient pole type. It is being run at synchronous speed with field circuit open. Stator is supplied from a three phase balanced supply. A voltmeter, which is connected across the line provide the maximum and minimum readings at 2825V and 2805V respectively. The line currents vary from 360A to 280A. Determine the direct and quadrature axis synchronous reactance per phase. The armature resistance may be neglected.

(5+5+5+5=20)

5.

a. Using double revolving field theory, explain the working principle of a single phase induction motor.

b. Draw the equivalent circuit of single phase induction motor. From the equivalent circuit draw the speed torque characteristics of single phase induction motor.

c. Single phase motor is not self-starting, however when rotated in a particular direction it continue to rotate in same direction. Why? How single phase motor can be made self-starting.

d. Following test result are obtain fron a single phase induction motor

No load test	220V; 4.6A, 125W
Block rotor test	120V; 9.6A, 460W

The stator winding resistance is 1.5Ω. Determine the equivalent circuit parameters

(3+4+3+10=20)

6.

a. What to you mean by fractional horsepower machine.

b. Classify different types of single phase motor

c. A 230V 50Hz, 4 pole single phase induction motor has following equivalent circuit impedance. Stator resistance (R_1)=2.2Ω; leakage reactance of stator winding (X_1)=3.1Ω;Rotor resistance referred to stator side(R'_2)=4.5Ω; Rotor leakage reactance referred to stator side(X'_2)=2.6Ω; Magnetizing reactance(X_m)=80Ω. Friction, windage and core loss 40W. For a slip of 0.03pu calculate (i) input current, (ii) power factor, (iii) developed power, (iv)output power, and (v) efficiency

d. Why two phase servo motor has high rotor resistance

(3+4+10+3=20)

7.

a. Derive the expression of transient reactance of a synchronous machine in terms of leakage reactance of field winding, leakage reactance of stator winding and reactance associated with mutual flux path and hence draw the equivalent circuit for transient reactance.

b. A synchronous generator is operated as an isolated unit at no load with field excitation set to yield 125% excitation. Per unit values of machine parameter are ; Synchronous reactance(x_s) =0.85pu; transient reactance(X'_s) =0.30pu and sub transient reactance (X''_s)=0.15pu. A three phase fault occurs at the armature terminal when coupling of the field coil with phase a of the stator winding is minimum.

i. Find the maximum value of phase a current

ii. What is the value of short circuit current during transient period

iii. Determine the value of sustained short circuit current

(10+10=20)

R-403
A-34

Enrolment No. | | | | | | | |

(UEE05B) Electrical

B.TECH Electrical Engineering , 5 th SEMESTER, END TERM EXAMINATION 2018

NAME OF SUBJECT : ELECTROMAGNETIC FIELD THEORY

CODE NO:- UEE05B

Full marks- 100 **Time- 3 hrs**

The figure of the Margin indicate full Marks for the Question

Answer question No.1 any four from the rest:

1. Define the terms in brief : (a) "Positive divergence" and "Negative divergence", (b) Stokes theorem, (c) Maxwell's equation from Faradays law (d) Characteristics Impedance of Transmission line, (e) Cut off frequency and cut off wavelength. 4×5=20

2. a) How we can reach one of the Maxwell's equation from Ampere's Law for conducting medium.
b) A solid cylindrical conductor of radius R has a uniform current density. Derive the expression for the radial distribution of H both inside and outside the conductor. Plot the variation of Magnetic field H as a function of radial distance from the center of the conducting wire.
b) What is eddy current and why in a conducting medium this current is circulating in nature? Why ferrite core is used for high frequency application? (7+6+7)=20

3. a) Derive the boundary conditions for the components of the E, D, H and B field at the Dielectric-Dielectric interface?
b) For Dielectric-Metal interface how boundary conditions for the components of the E, D, H and B field conditions will be modified?
c) What do you understand by the phase velocity of a propagating electromagnetic wave? What is the role of group velocity in the propagation of pulsed electromagnetic wave.
d) What do you understand by zero dispersion? How you can define normal and anomalous dispersion of a propagating electromagnetic wave? (6+6+4+4)=20

4. a) What is conduction current and what is displacement current?
b) What will be the current density distribution for AC current passing through a current carrying conductor having circular cross section? What is skin depth and what is the role of frequency on it?
c) What is Poynting vector and what is Poynting theorem? (4+8+8)=20

5. a) How electromagnetic wave propagate through a free space? From Maxwell's equations how we can reach the wave equation for Magnetic field H in free space for Transverse Electromagnetic (TEM) wave Propagation.
b) What do you understand by forward and backward wave in the propagation of TEM wave through conducting medium? Justify the condition for the formation of standing wave and some application where standing wave formation is required. (10+10)=20

6. Write detailed notes on any two of the following: (10x2)=20

a) Voltage and current reflection coefficient in terms of VSWR.
b) Vector Magnetic Potential.
c) Different Magnetic materials.

Enrolment No. | | | | | | | |

S_5(UEE05B13)EE

B.Tech 5th Semester End Term Examination, 2018

Control System-I

Paper code-UEE05B13

Full Marks: 100

Time: 3 hours

The figures in the margin indicate full marks for the questions.

Question no. 1 is compulsory and answer any 5 questions from the rest.

1. Choose the correct alternative from the given options:- **1X25=25**

a) Impulse response of a system with single pole at the origin is
i) constant ii) ramp iii) exponentially decaying

b) The error detector element in a control system gives
i) the sum of the reference signal and the feedback signal
ii) the difference of the reference signal and the feedback signal
iii) the difference of the reference signal and the output signal

c) A speed control system has the transfer function w(s)/V(s) = 100/(2+10s). 1 volt of input corresponds to an output of i) 100 rad/sec ii) 10 rad/sec iii) 50 rad/sec

d) The centroid for the root locus plot of the unity feedback system G(s)= K/[s(s+4)(s+5)] is i) -1 iii) 3 iii) -3

e) For damping ratio>1, roots of the characteristic equation have i) positive imaginary parts ii negative imaginary parts iii) zero imaginary parts

f) A servomotor is connected through a gear ratio of 10 to a load having moment of inertia J and friction coefficient f. The equivalent parameters referred to motor side are
i) J_{eq} = 0.01 J and f_{eq} = 0.01 f ii) J_{eq} = 10 J and f_{eq} = 10 f iii) J_{eq} = 0.1 J and f_{eq} = 0.1 f

g) Peak overshoot of step input response of an underdamped second-order system is explicitly indicative of i) settling time ii) rise time iii) damping ratio

h) 'Angle of arrival' corresponds to i) complex-conjugate zeros ii) complex-conjugate poles iii) Real poles

i) A temperature control system has zero error to a constant tracking input and an error of 0.5 °C to a tracking input, linear in time, rising at the rate 40°C/sec. The type of the system is i) 0 ii) 1 (iii) 2.

j) The steady state error for an input 2u(t) applied to a type 0 system is i) 1/[2(1+K_p)] ii) 2/(1+K_p) iii) 0

k) The transfer function representation of a dc tachogenerator is i) E(s)/θ(s)=K ii) E(s)/θ(s)=K/s
iii) E(s)/θ(s)=Ks , where E is generated voltage, θ is angular position and K is tachogenerator constant

l) In a critically damped system i) oscillations are prominent ii) no oscillations are observed iii) oscillations just disappear

m) The gain for drawing Bode plot for the transfer function G(s)H(s) = 20/[s(s+2) is i) 20 ii) 10 iii) 2

n) Steady-state errors are not affected due to i) P-control ii) PD –control iii) PI-control

o) Open loop system possesses i) low accuracy, low stability ii) high accuracy, high stability iii) low accuracy, high stability

p) With increasing damping ratio, peak overshoot i) increases ii) decreases iii) remains unaffected

q) Intial slope of Bode plot indicates i) system type ii) Gain margin iii) stability

r) If the root locus branches cross the imaginary axis then the time response is i) over-damped ii) critically damped iii) unstable

s) Which of the following is an example of open loop system?
i) Aqualung ii) Windscreen wiper iii) circulatory system of an animal

t) Phase lag compensation network has i) dominant pole ii) dominant zero iii) both dominant zero and dominant pole

u) The open loop DC gain of a unity feedback control system having closed loop transfer function as $(s+4)/(s^2+7s+13)$ is i) 4/13 ii) 4/9 iii) 13/4

2. Sketch the Bode plot for the open loop transfer function $G(s)H(s) = [2(s+0.25)]/[s^2(s+1)(s+0.5)]$. From the bode plot determine phase cross over frequency, gain cross over frequency, gain margin and phase margin. Is the system stable?

10+(1+1+1+1+1)=15

3. The transfer function of a unity feedback control system is given by G(s) = K/[s(s+2)(s+4)]. From the root locus diagram of this function determine the value of K to have 40% overshoot for unit step input.

15

4. Using Nyquist criterion determine the limiting value of K for closed loop stability of the system whose open loop transfer function is given as G(s)H(s) = [K(s+1)]/[(s+0.5)(s-2)] 15

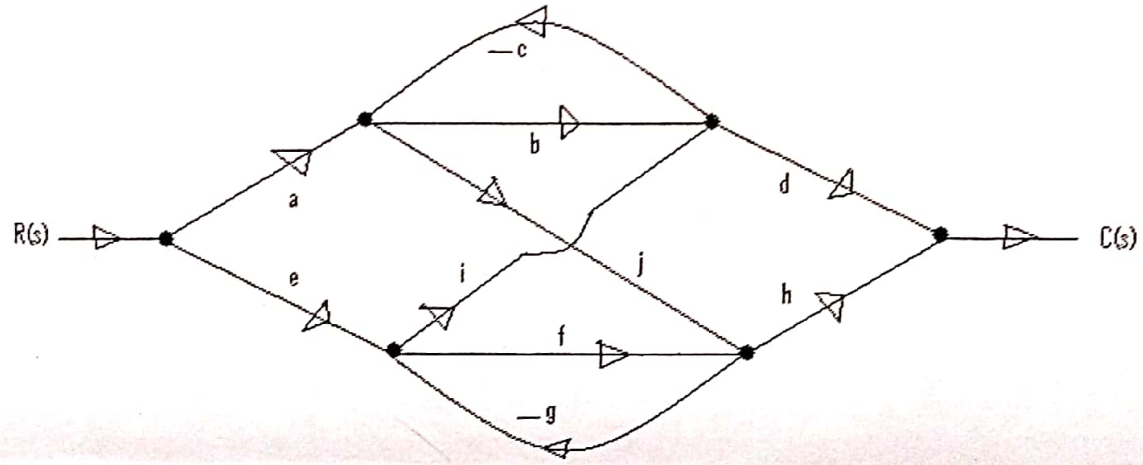
5. a) Consider an open loop system defined by the transfer function C(s)/R(s) = K/(1+sT), where K is the system gain (K>1) and T is the time constant. Show that introducing feedback to the system improves the speed of response of the system.

b) State the advantages and disadvantages of P-control action.

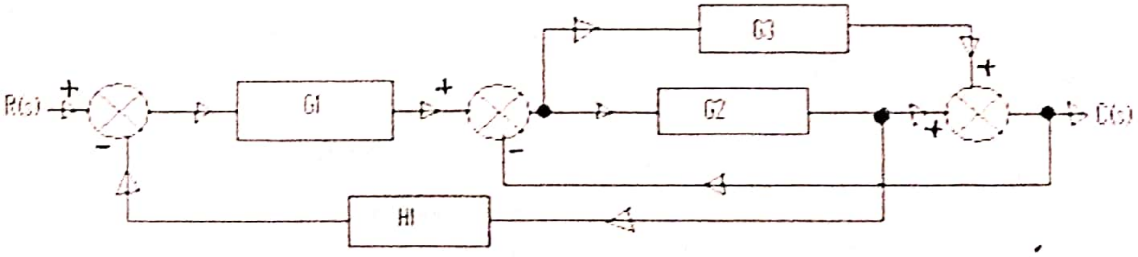
c) A closed loop speed control system uses a 2-phase ac servomotor. The error signal is amplified by an amplifier and then applied to the motor input. The motor shaft is connected to a load through gear having a ratio of 10:1. The amplifier gain is 20 and tachogenerator used in the feedback path has gain constant of 0.2 V/(rad/sec). The moment of inertia and coefficient of viscous friction referred to motor shaft side are respectively 1.5×10^{-4} Kg-m^2 and 1×10^{-4} Nm/(rad/sec). The motor has a stall torque of 0.12 Nm at 100 V input and the torque decreases by 50% when the speed increases to 2000 rpm. Determine the transfer function of the system. 3+4+8=15

6. Use Mason' gain formula to determine the overall transfer function for the following systems:

a)



b)



10+5=15

7. Write short notes on:- 5 x3=15

i) PD control action

ii) Phase lag compensation

iii) Field controlled dc servomotor