Tanta University

Department: Electronics and Electrical Communication Eng.
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Electrical Communications	Course Code: EEC 4106	Year: 4th Power
Date: 20 /1/ 2012	Allowed time: 3 hrs	No. of Pages: (1)

Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches)

Question (1)

(a) Find Fourier series for the periodic signal shown in Figure 1, and sketch its amplitude and phase spectrum.

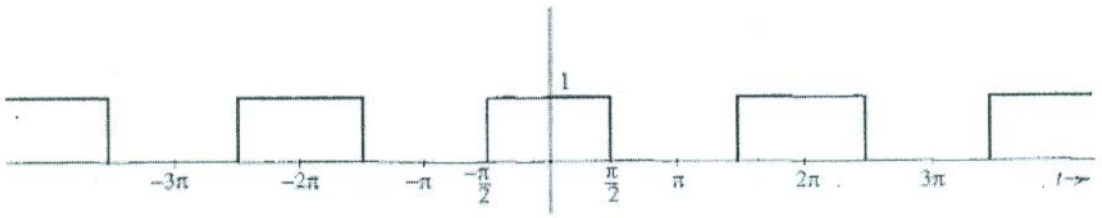

Figure 1

(b) Find the power for the signal shown in Figure 1.

Question (2)

(a) Compare between the energy signal and power signal.

(b) Find the Fourier transform of the following functions, $rect(t/\tau)$, $\delta(t)$, $\mathrm{sgn}(t)$, **and** $u(t)$. **Sketch their frequency spectrum.**

Question (3)

(a) Explain the effect of varying the modulation index of the AM signal (Support your answer with sketches).

(b) Show how the square law device is used to modulate and demodulate the AM signal.

(c) Consider the message signal $m(t) = 20\cos(2\pi t)$ **and the carrier wave**

$$c(t) = 50\cos(100\pi t);$$

(i) Determine and sketch the resulting AM wave for 75 % modulation.

(ii) Find the ratio of the carrier power to the total power, Comment.

Question (4)

(a) Write the general equation for the FM signal.

(b) Compare NBFM and WBFM, in terms of spectrum, bandwidth, power, advantages, and disadvantages (write the general equation for each).

(c) Show how to modulate and demodulate the FM signal (sketch block diagram).

Best Wishes of Success

Problem number (4) (24 Marks)

a) Explain the principle of reluctance-motor operation showing:

i) how it accelerates and synchronizes (8 Points)

ii) suitable diagrams to illustrate the rotor positions at no load, partially loaded and maximum load for a two pole machine. (8 Points)

b) A reluctance motor operating at 220V, 50 Hz, has a torque angle of 15°. The motor is supplied by an isolated generator. Heavy demands on the generator cause a 5% drop in both voltage and generator speed. Assuming a constant torque load on the motor shaft, determine the new torque angle. (8 points)

Problem number (5) (24 Marks)

a) Explain the principle of operation of a stepper-motor with 8 teeth to be energized on the stator and 6 teeth on the rotor (6 Points)
showing:

i) suitable diagram of a simple circuit arrangement for sequencing currents to the stator coils. (6 Points)

ii) how half-stepping and microstepping are accomplished. (6 Points)

b) Determine the pulse rate requited to obtain 3600 r/min from a stepper motor with a resolution of 600 steps/rev. (6 points)

END OF THE EXAM QUESTIONS

LUCK◄GOOD►BYE

As-salamu Alaykum wa rahmatullah wa barakatuh
repeat 4EPM spec_mach lay7a_1997 january 2011-12

Tanta University

Department: Elec. Power and Machines Engineering
Curriculum 1997 (120 Points)

Faculty of Engineering

Title: Special Electrical machines	**Course Code: EP4103**	**Year: Fourth year**
Date: January 2012 (First term)	**Allowed time: 3 hrs**	**No. of Pages: (2)**

الإمتحان مكون من 5 أسئلة فى صفحتين

Problem number (1) (24 Points)

a) Neglecting magnetic saturation, and aided with equations, explain how the torque developed by following motors varies with armature current or armature voltage:
i) Hysteresis motor ii) Reluctance motor iii)Single-phase motor (12 Points)

b) Please note that NOT all the given data are needed.
A two-phase 5-hp 220-V four pole 60-Hz two-phase squirrel-cage induction motor is operated from an unbalanced two-phase source whose forward and backward components of voltages are, respectively, 218.5 - j18.2 and 11.5 + j18.2 volts. At a slip of 0.05 the forward and backward impedances are respectively 16.46 + j7.15 ohms and 0.451+ j 2.84 ohms. The equivalent-circuit parameters in ohms per phase referred to the stator side are: $R_1 = 0.534$, $R_2 = 0.956$, $X_1 = 2.54$, $X_2 = 2.96$ and $X_\varphi = 70.1$. Determine: (1) The air-gap torque (2) The effective values of the phase currents (3) The phase voltages (12 Points)

Problem number (2) (24 Points)

a) State, as many as you know of the advantages and disadvantages of brushless DC motors as compared to DC motors. (6 Points)

b) Explain the principle of operation of a three-phase unipolar-driven brushless DC motor showing:
i) diagram of a motor cross-section with circuit arrangement for sequencing currents. (9 Points)
ii) the switching-sequence table for CW and CCW directions. (9 Points)

Problem number (3) (24 Marks)

a) Explain why the torque developed by a universal motor varies as the square of the armature current. (8 Points)

b) Using suitable diagram, show how the direction of rotation of a universal motor is reversed. (8 Points)

c) How may the speed of a universal motor be adjusted? (8 Points)

The third question

The speed of a 20-hp 300-v 900-rpm separately excited dc motor is controlled by a 3-Φ full converter. The field circuit is also controlled by 3-Φ full converter.The ac input to the armature and field converters is 3-Φ ,y-connected, 220-v, 50 HZ.The armature resistance is R_a=0.25 Ω, the field circuit resistance is R_f=145 Ω,and the motor voltage constant is K_V=1.2 V/A- rad/s.The no-load losses can be considered negligible , the armature and field currents are continous and ripple free

a) If the field converter is operated at the maximum field current and the developed torque is T_d= 116 N.m at 900 rpm, determine the delay angle of the armature converter α_a.

b) If the field circuit converter is set for the maximum field current , the developed torque is T_d= 116 N.m, and the delay angle of armature converter is $\alpha_{a=}$ 0 ,determine the speed of the motor .

c) For the same load demand as in part b , determine the delay angle of the field converter if the speed has to be increased to 1800rpm.

The fourth question

1-Mention the possible control modes of a dc chopper drive.

2-A dc chopper is used in rheostatic braking of a dc series motor. The armature resistance,R_a=0.03 Ω and the field resistance, R_f=0.05 Ω.The braking **resistor,** R_b =5 Ω.The back emf constant, K_v =14 mV/A-rad/s.The average armature current is maintained constant at I_a=250A. The armature current is continous and has negligible ripple. If the duty cycle of the chopper is 60%, determine the (i) average voltage across the chopper, V_{ch} **(ii) power dissipated in the resistor,** P_b **(iii)equivalent load resistance of the motor acting as a generator,** R_{eq} **(iv) motor speed and(e) peak chopper voltage** V_p

The fifth question

Explain the various possible arrangement of UPS system

Good Luck.

TANTA UNIVERSITY
Faculity Of Engineering
Electrical Power and Machines Engineering Department

Course:Applications of Power Electronics **Time : 3 hours**
Year : 4th year(Power&Machines). **Date : 12/1/2012**

Answer All The Questions

Clarify your answer with the suitable sketches as you can

The first question

a) Mention the firing circuit requirements.

b) For the protection component to improve the performance of SCR, if the minimum gate voltage &currant are 1.5V & 100 mA , R_2=20 Ω &the firing circuit voltage is 8 V. Find R_1 to ensure turn-on of SCR

c)Design firing circuit using Op-Amp.for 1- ϕ full converter.

The second question

*Compare between ac and dc switches?
* sketch the different forms of ac switches?
* what are the types of ac power supplies ? Explain the switched-mode type.
* The dc output voltage of the switched mode bridge power supply is v_0= 24V at a resistive load of R=0.4Ω .The turns ratio of the transformer a= N_S/N_p=0.5. Determine the

a) Average input current I_S
b) Average transistor current I_a
c) Peak transistor current I_p
d) rms transistor current I_R
e) open circuit transistor voltage , V_{0C}

بقية الأسئلة فى الصفحة الثانية

Tanta University

Department: Electrical Power and Machines Engineering
Total Marks: 120 Marks

Faculty of Engineering

Course Title: Power System Protection	Course Code: EPM41	Year: 4th
Date: November 2010 (Reset)	Allowed time: 3 hrs	No. of Pages: (1)

Answer the following questions

Problem number (1) **(30 Marks)**

a) **What** is protective relaying? **Explain** the various functions of protective relaying? **State** the methods used for fault detection?

b) What is the protective zone? Why the protective zones are arranged in overlap fashion? With the help of simple diagram, show how the zones are overlap?

Problem number (2) **(30 Marks)**

a) Describe any one type of electromagnetic attracted armature type?

b) Explain with the help of neat sketch, the construction and working of induction type overcurrent relay.

Problem number (3) **(30 Marks)**

a) What is IDMT characteristic of a relay? What is the procedure of setting IDMT relay? What initial data is required? How is the directional relay different than simple IDMT relay?

b) Choose time settings for the normal IDMT relays at R_1 and R_2 shown in the following figure.

Phase fault currents are shown.
Load current, through R_2 = 200A, and through R_1 = 75A.
CT ratio at R_2 = 200/5 and at R_1 = 100/5. Plug setting are in steps of 25% to 200%.
The time-current characteristic of the relay is given in the following table

Plug Setting Multiplier	2	3	5	10	15	20
Time for TS of 1 (sec)	10	6	4.1	3	2.5	2.2

Problem number (4) **(30 Marks)**

a) Explain what is meant by distance protection. What arrangement is made to make the relay measure positive sequence impedance only for single line to ground fault (SLG)?

b) Explain why second zone of distance relay can be omitted in some cases and what's happen in this situation.

Good Luck

Course Examination Committee

Dr. Mohamed Abo Elazm