the armature current drops to its rated value. The field resistance is 115 ohm and the total armature circuit resistance is 0.348 ohm. Neglect armature inductance.

a. Find the external resistance required at the time of starting the motor.

b. Determine the value of the first resistance element that must be cut out, when the armature current drops to rated value.

c. Find the external resistance to be cut out in second step.

d. Find the total number of steps required and their resistance values.

(10 Marks)

Q4

1. Discuss the various possible methods of speed control of DC series motors? (7 Marks)
2. Discuss the series and parallel connection of DC series motors? (7 Marks)
3. A 250 V, DC shunt motor has an armature resistance of 250 ohm when driving a constant load torque at 600 rpm, the motor draws 21 A. what will be the new speed of the motor if an additional 250 ohm resistance is inserted in the field circuit. (10 Marks)

Q5

1. What are the factors affecting the choice of specific magnetic and electric loading? (7 Marks)
2. Derive the expressions of the relation between the output power and the power developed by armature in small and large power DC machines. (7 Marks)
3. Find the diameter and length of armature for a DC motor having the following particulars.

Armature power =77.5 Kw

Speed = 840 rpm

Number of poles = 4

The product of specific magnetic and electric loadings is related to the armature diameter as follows:

D (m)	0.1	0.2	0.3	0.4	0.5	0.6
$B_{av}.ac$	5200	9300	12700	15500	18000	20000

The ratio of pole arc to pole pitch = 0.7.

Select the design which gives a square pole face. (10 Marks)

Good Luck

TANTA UNIVERSITY **FACULTY OF ENGINEERING**

Electrical Power Systems and Machines Department

Final Term Exam **Course: Electrical Machines (1) Code: EPM 2208**

Level: 2nd Year Electrical **Academic Year: 2010/2011**

Date: 19.06.2011 **No. of Pages: 2** **Time Allowed: 3.0 Hrs.**

Maximum 120 Marks

Try to Answer All Questions

Q1

1. Discuss the various types of DC machines. (7 Marks)
2. Draw and explain the no-load and load characteristics of DC shunt, series and compound generators. (7 Marks)
3. A 4 pole, DC shunt generator with a shunt field resistance of 100 ohm and an armature resistance of 1 ohm has 378 wave connected conductors in its armature. The flux per pole is 0.01wb. If a load resistance of 10 ohm is connected across the armature terminals and the generator is driven at 1000 rpm. Calculate the power absorbed by the load. (10 Marks)

Q2

1. Explain the effect of armature reaction in a DC shunt generator. How it's demagnetizing and cross magnetizing ampere turn calculated? (8 Marks)
2. A 4 pole, 50 Kw, 250 V wave wound shunt generator has 400 armature conductors. Brushes are given a lead of 4 commutator segments. Calculate the demagnetization amp-turn per pole if shunt field resistance is 50 ohm. Also calculate extra shunt field turns per pole to neutralize the demagnetization. (8 Marks)
3. A 30 hp, 440 V, 4 pole, wave wound DC shunt motor has 840 armature conductors and 140 commutator segments. Its full load efficiency is 88% and the shunt field current is 1.8 A if brushes are shifted backwards through 1.5 segments from the geometrical neutral axis. Find the demagnetizing and distorting amp-turns per pole. (8 Marks)

Q3

1. Explain how is self excitation achieved in shunt generator? Also explain how is the output voltage varies? (7 Marks)
2. With an aid of circuit diagram, describe the procedure for connect and disconnect DC shunt generators in parallel. (7 Marks)
3. In a 230 V, 10 Kw DC shunt motor, its required that the starting armature current should not exceed twice its rated armature current. During the starting of the motor, the starting resistance is cutout in steps, as soon as

Tanta University

Department: Electrical Engineering
Total Marks: 35 Marks

Faculty of Engineering

Course Title: **Technical Writing**	Course Code: **EEP12H4**	Year: 1st
Date: June th 2011 (Second term)	Allowed time: 2hrs	No. of Pages: (1)

Remarks: (Answer the following questions, answers may be supported by sketches)

Question one (10 Marks)

a) What is technical writing? Who can write it and why?
b) Mention briefly the general procedure to create an effective technical and scientific writing.
c) Good technical writing (communication) is **accurate, clear, concise, coherent,** and **appropriate.** Discuss this for the following example:

"The flow of electrical current can induce the migration of impurities or other defects through the bulk of a solid. This process is called electromigration. In simple electromigration, the force on the defect is thought to have two components. The first component is the force created by direct interaction between the effective charge of the defect and the electric field that drives the current. The second component, called the "wind force," is the force caused by the scattering of electrons at the defect".

d) How could you build a literature review?

Question two (6 Marks)

a) Mention the explicit and implicit purposes of documents?
b) Layperson read technical and scientific documents for variety of purposes. State these purposes.
c) What is the document density?
d) To be effective, technical writing must target its audiences. How?

Question three (6 Marks)

a) What are the standard document types?
b) Define extensively the agenda and minutes.
c) What is the job acceptance letter?
d) Mention the difference between written communication and oral presentation.

Question four (6 Marks)

a) What are reports? Mention their types.
b) What is the progress report?
c) What do you know about design and feasibility report?
d) How could you build your resume (C.V)?

Question five (7 Marks)

a) Why using graphics in the documents?
b) What are the types of common graphics?
c) Mention the difference between tables and graphics.
d) What are bar graphs? Mention their types.
e) Mention the guidelines to use line graph effectively.
f) Mention the guidelines to use diagrams effectively.
g) Describe the general guidelines to use graphics effectively.

With the best wishes
Dr. Mohamed Mahgoub Bassuni

b) The voltage of an a.c. source fluctuates between 240 and 210 v. This supply is used to feed a heating load of resistance R=10Ω via a phase controlled a.c. controller. Closed loop control for the switch firing is used to fix the load power at 4 KW. Find the range of variation of α and λ due to the closed loop control.

Question (3) ***(20Marks)***

a- A single phase centre-tap rectifier of V1= 200 V and N2=1.5 N1 is used to charge a highly inductive battery load of R= 5 ohm and E= 100V ,find the firing angle at which the power delivered to the load 1.5 kw, also find at the a.c source λ, μ and cosθ.

b-A half controlled single phase bridge is used to charge a battery with an emf of 120 volts and 1Ω internal resistance through a smoothing reactor (L>>) at I_d=10A from a 200v a.c. source. Find the firing angle, the circuit power factor, and the distortion factor. Also, find the energy stored in the battery in 5 hours.

Question (4) ***(20Marks)***

a) Explain the principle of operation of parallel capacitor commutation process in chopper circuits and given one example to show that.

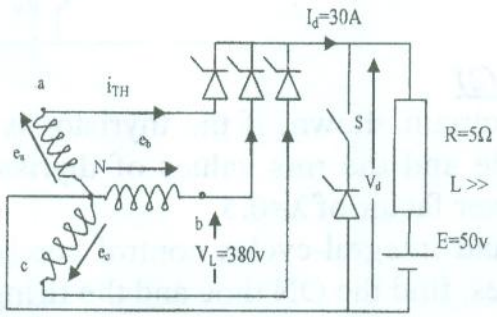
b)In the rectifier circuit shown in the figure,

i) Calculate the firing angle α, the load power and also the average and rms thyristor currents.

ii) If the charging current of the battery is varied from 2A to 40A, find the required range of variation of α.

iii) Show how to discharge the battery into the a.c. source at a current of 5A via the same circuit.

iv) Repeat a & b if the switch S is close



Good luck

Tanta University
Faculty of Engineering
Final Examination
Academic Year: 2010-2011

Department: Electrical Power Eng.
Year: Second
Subject/Code: Power Electronics
Time Allowed: 3hours
Date: 22/6/2011

Answer all the following questions

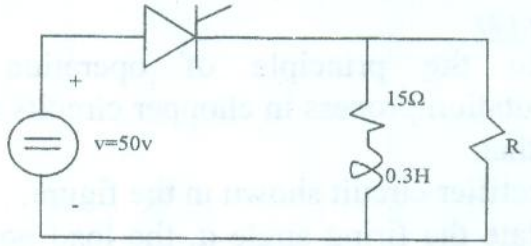
Question (1) ***(20Marks)***

a) Define the factors: λ, μ and $\cos\theta$. Also, show that $\lambda=\mu\cos\theta$, where θ is the displacement angle.

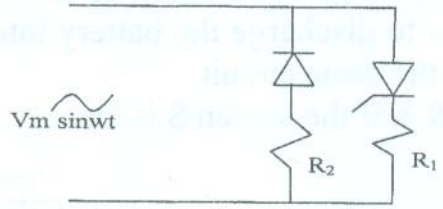
b) In the circuit shown, the SCR has a latching current level of 100mA, and is fired by a pulse of 60μs duration. Show that without the resistance R, the thyristor will fail to remain ON when the firing pulse ends, and then:

i-find the maximum value of R to ensure firing.

ii-find the required duration of the firing pulse to insure firing without the resistance R.



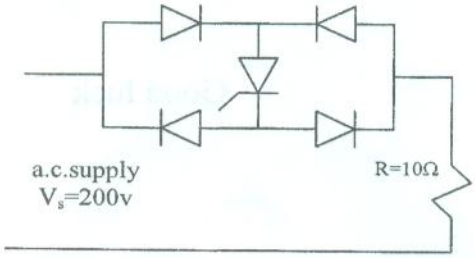
c) In the circuit shown R1 and R2 dissipate equal power and R1=R2/2. Find the firing angle of the thyristor.



Question (2) ***(15Marks)***

a) In the circuit shown, if the thyristor is phase-controlled, find the firing angle and the rms values of thyristor and diode currents at a circuit power factor of $\lambda=0.5$.

If phase and integral-cycles control combined are applied such that T=20 cycles, find the ON time and the firing angle required to obtain a heater power of 2.3KW.



Tanta University

Department: Physics and Engineering Mathematics
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Engineering Mathematics 3(b)	Course Code: PME2209	Year: 2nd
Date: June 15th 2011 (Second term)	Allowed time: 3 hrs	No. of Pages: (1)

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

Problem number (1) **(15 Marks)**

a) If $f(x,y)=u(x,y)+iv(x,y)$ is an analytic function show that $\frac{\partial f(x,y)}{\partial \bar{z}}=0$, (the complex form of Cauchy-Riemann conditions). 5 Marks

b) The function $f(z)=\frac{1}{z}$ is used to determine a field known a dipole 10 Marks

- Express $f(z)$ in the form $f(z)=\varphi(x,y)+i\psi(x,y)$.
- Sketch the equipotentials $\varphi(x,y)=1,\frac{1}{2},\frac{1}{4}$ & stream lines $\psi(x,y)=1,\frac{1}{2},\frac{1}{4}$.

Problem number (2) **(15 Marks)**

a) Show that the nonzero vectors z_1 and z_2 are perpendicular iff $\mathrm{Re}(z_1\bar{z}_2)=0$. 5 Marks

b) Let a, b and c be real constants. Determine a relation among the coefficients that will guarantee that the function $v(x,y)=cx^2+bxy+ay^2$ is harmonic and find its conjugate harmonic. 5 Marks

c) Let C be the unit circle, for any real constant a, show that $\int_C \frac{e^{az}}{z}dz=2\pi i$, 5 Marks

Then show that $\int_0^{\pi} e^{a\cos\theta}\cos(a\sin\theta)d\theta=\pi$.

Problem number (3) **(20 Marks)**

a) Find all possible Taylor and Laurent series expansions of $f(z)=\frac{-1}{(z-1)(z-2)}$, 10 Marks

specify the region of convergence of each of the above series.

b) Find the general solution of the following differential equation: 10 Marks

$$x^2y^{(2)}(x)+xy^{(1)}(x)+(x^2-\frac{4}{9})y(x)=0.$$

Problem number (4) **(20 Marks)**

a) Prove that $\int_0^1 x^m(\ln x)^n dx=\frac{(-1)^n n!}{(m+1)^{n+1}}$, n is positive integer. 5 Marks

b) Use Bessel generating function to prove that: 15 Marks

- $\cos(x\sin\theta)=J_0(x)+2[J_2(x)\cos 2\theta+J_4(x)\cos 4\theta+\ldots\ldots]$.
- $\sin(x\sin\theta)=2[J_1(x)\sin\theta+J_3(x)\sin 3\theta+\ldots\ldots]$.
- $J_0(x)=\frac{2}{\pi}\int_0^1\frac{\cos xt}{\sqrt{1-t^2}}dt$.

With my best wishes

Dr. Waheed Kamal Zahra

determine (*a*) the pressure at which the steam should be reheated and (*b*) the thermal efficiency of the cycle. Assume the steam is reheated to the inlet temperature of the high-pressure turbine

Question No. 5

For theoretical cycle for an internal combustion engine, the pressure and the temperature at the beginning of compression are 98 kN/m^2 and 50 °C. The pressure at the end of compression is 394 kN/m^2 and the maximum pressure of the cycle is 588 kN/m^2. Heat is added partly at constant volume and partly at constant pressure and the heat added at constant pressure is thrice the amount of volume. Heat rejected at constant volume. Calculate for the cycle: a) The compression ratio. b) The cutt of ratio. c) The thermal efficiency.

Question No. 6 A rigid tank contains 10 kg of water at 90°C. If 8 kg of the water is in the liquid form and the rest is in the vapor form, determine (*a*) the pressure in the tank and (*b*) the volume of the tank.

مع اطيب التمنيات بالتوفيق
أ.د عبد النبى قابيل

Tanta University
Faculty of Engineering
Mechanical Power Engineering Department

Final Exam (2011)
Second Year, electrical power
Power plant
Time allowed 3 hour

يسمح باستخدام جدول وخريطة البخار

. **Answer all questions**.

Question No. 1:

a) Explain the meaning of the following with the aid of sketches:-

1- System, State, Process, and cycle.

2- Reversible, Adiabatic and Isentropic processes.

b) What is the difference between:-

1- Intensive and extensive property.

2- Critical point and triple point.

c) Drive the relation for work for closed system.

d) What is the Type of Power Plants.

Question No. 2:.

A gas in a piston-cylinder assembly undergoes an expansion process for which the relationship between pressure and volume is given by $PV^n = C$. the initial pressure is 3 bar, the initial volume is 0.1 m^3, and the final volume is 0.2 m^3. Determine the work for the process, in kJ, if (a) n = 1.5, (b) n = 1.0, (c) n = 0.0.

Question No. 3:

A heat pump is used to meet the heating requirements of a house and maintain it at 20°C. On a day when the outdoor air temperature drops to -2°C, the house is estimated to lose heat at a rate of 80,000 kJ/h. If the heat pump under these conditions has a COP of 2.5, determine:

(a) The power consumed by the heat pump.

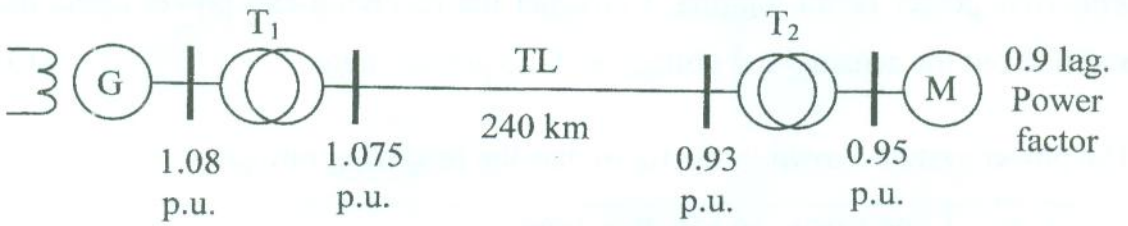
(b) The rate at which heat is absorbed from the cold outdoor air.

Question No. 4:

Consider a steam power plant operating on the ideal reheat Rankine cycle. Steam enters the high-pressure turbine at 15 MPa and 600°C and is condensed in the condenser at a pressure of 10 kPa. If the moisture content of the steam at the exit of the low-pressure turbine is not to exceed 10.4 percent,

Problem number (2) **(45 Marks)**

a) The simple network shown in the figure is used to supply a factory at the end of the transmission line. The motors in the factory require a voltage of 0.96 p.u. at least to operate. The actual voltages on the system are indicated in p.u. as shown. Suggest *suitable* method(s) to find a solution for the voltage problem in the network and explain this method in detail (15)



b) Explain in detail the method by which the power factor of a certain load can be *optimally* improved. (15)

c) Compare between transmitting high power using HVDC systems and underground cables. (15)

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

a) Aided with sketches, describe in detail the typical construction of three- core underground cables. (15)

b) A single-core cable is used to supply a certain load. The used conductor has a radius of 0.5 cm and the cable has three different insulating materials with relative permittivities of 6, 4 and 2 respectively. The maximum electric strengths in the three materials are respectively: 70, 50 and 38 kV/cm). If the minimum diameter of the cable is 8.3 cm, find the operating voltage of the cable. (15)

Good Luck

Course Examination Committee
Dr. Ahmed Refaat Azmy
Dr. Ibrahem Bedier
Dr. Ayman Abd Rabo
Dr. Zakarya Salem
Course Coordinator: Dr. Ahmed Refaat Azmy

Title: Electric power engineering (2)	**Course Code: EPM2207**	**Year: Second year**
Date: 12/6/2011	**Allowed time: 3 hr**	**No. of Pages: (2)**

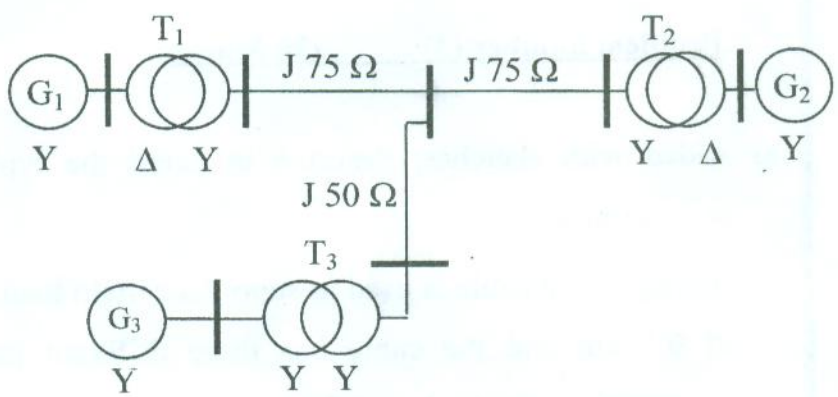
Problem number (1) **(45 Marks)**

a) A 60Hz three-phase transmission is 375 km long. It has a total series impedance of 35 + j 140Ω and a shunt admittance of $j9.3*10^{-4}$ moh. It delivers 40 MW at 220 kV with 90% power factor lagging. Construct the receiving-end power circle diagram and find out the sensing-end voltage and the power angle. (15)

b) The power system shown in the figure has the following ratings:

Generator G_1	200 MVA, 20 kV, $X_d = 15\%$
Generator G_2	300 MVA, 18 kV, $X_d = 20\%$
Generator G_3	300 MVA, 20 kV, $X_d = 20\%$
Transformer T_1	300 MVA, 220Y/22 kV, $X_d = 10\%$
Transformer T_2	Three single-phase units each rated 100 MVA, 130Y/25 kV, X=10%
Transformer T_3	300 MVA, 220/22 kV, $X = 10\%$

The transmission line reactances are as indicated in the figure. Draw the reactance diagram in per unit choosing the Generator 3 circuit as the base. (15)



c) For the shown network, construct the admittance matrix. It is required to reduce the network size by eliminating buses 3 and 4. Derive the reduced admittance matrix and draw the network after reduction. (15)