Tanta University

Department: Electrical Power Engineering
Total Marks: 40 Marks

Faculty of Engineering

Course Title: **Technical Writing**	Course Code: **MEP12H4**	Year: 2nd
Date: June 11 th 2013	Allowed time: 2hrs	No. of Pages: (1)

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

Question one (12 Marks)

a) Define the technical writing. Who can write it and why?
b) Describe the general procedure to create an effective technical 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) Problem statement often have three elements. State these elements accurately.

Question two (6 Marks)

a) Mention explicit and implicit purposes of documents.
b) Experts read technical and scientific documents for variety of purposes. State these purposes.
c) How could you target your audiences?
d) Explain how the effective technical writing can create trust and establish credibility.

Question three (6 Marks)

a) State the standard document types.
b) Define extensively the meeting documents.
c) What are the job application and 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 trip report?
c) What are the main elements of research article?
d) How could you write a memoranda for requesting a financial support?

Question five (10 Marks)

a) What do you know about design and feasibility reports?
b) Describe in details the meaning of letters and its types.
c) Define document density and its guidelines.
d) How could you target your audience.
e) The discipline of modern technical writing came of age during world ware II. describe

With the best wishes
Dr. Mohamed Mahgoub Bassuoni

الآن كهربية ١

Tanta University
Faculty of Engineering
Electrical Power and Machines Engineering Department

Final Exam	
Second year: Electrical Power and Machines Engineering	**Time: 3 hour**
Total Marks: 120	**Date: 26 May, 2013**
Course Title: Electrical Machines (1)	**Code: EPM2208**

Answer all questions

Question 1: [28 Marks]

[a] Aided with neat illustration(s) and equation(s), explain the speed-torque and torque-current characteristics of shunt, series and compound dc motors. *[8 Marks]*

[b] Aided with neat illustration(s), explain the difference between three-point and four-point dc shunt-motors starters? What are the additional features incorporated in a four-point starter? *[6 Marks]*

[c] The armature resistance of a 25 HP, 250 V series motor is 0.1 Ohm, the brush drop is 3 V and the resistance of the series field is 0.05 Ohm. When the series motor takes 85 A, the speed is 600 rpm. Calculate: (i) the speed when the current is 100 A (ii) the speed when the current is 40 A (iii) the speed in (i) and (ii) if a diverter of 0.05 Ohm is used. Neglect armature reaction and use linear-portion of saturation curve. *[14 Marks]*

Question 2: [22 Marks]

[a] The armature and shunt field resistances of a 500 V shunt motor are 0.1 Ohm and 125 Ohm respectively. A resistance of 1.5 Ohm is connected in series with the armature and it runs at 800 rpm taking a current of 60 A. What must be the resistance of a diverter connected across the armature to reduce the speed to 600 rpm. Assume the armature current to be constant. [10 Marks]

[b] A 500 V, 45 Kw. 600 rpm DC shunt motor has a full load efficiency of 90%. The field resistance is 200 Ohm, and armature resistance is 0.2 Ohm. Find the speed under each of the following conditions at which the motor will develop an elecro-magnetic torque equal to rated value:

(i) Regenerative braking: no limiting resistance.

(ii) Plugging: external limiting resistance of 5.5 Ω inserted.

(iii) Dynamic braking: external limiting resistance of 2.6 Ω.

The field current is maintained constant and armature reaction and the brush drop may be neglected. *[12 Marks]*

Question 3: [30 Marks]

[a] Aided with neat illustration(s) and equation(s), explain in details, Swinburne's test for determining the efficiency of a DC machine. Explain briefly how the efficiency can be found in brake test. *[8 Marks]*

[b] A 200 V, 12 kW shunt motor has a maximum efficiency of 90% and a speed of 800 rpm when delivering 80% of its rated output. The shunt-field resistance is 80 ohms. Determine the efficiency and speed when the motor draws a current of 70 A from the mains. *[10 Marks]*

[c] Hopkinson's test on two identical shunt machines gave the following readings: Supply voltage = 250 V, Field currents = 7 A and 6 A, Line current = 40 A, Armature current of motor = 250 A, Armature resistance of each machine = 0.016 ohm, Voltage drop/brush = 1 V. Find the efficiency of each machine. *[12 Marks]*

Question 4: [28 Marks]

[a] The armature of a 4 pole d.c machines has 24 coils and is lap connected. How many equalizing rings are needed in order to have 100% equalization? Write the coil numbers of the coils connected to one of the rings. *[3 Marks]*

[b] The armature of a 10 poles d.c. machine has 150 slots each accommodates 4 conductors wound with 20 parallel paths. Pole arc/pole pitch is 0.7. Flux per pole is 0.0808 web.. Armature diameter and axial length are respectively 1.276 and 0.31 meters respectively. Given that the electromagnetic torque at full load is 16050 N.m, find (1) full load armature current (2) magnetic loading (3) electric loading (4) frequency (5) peripheral speed in meter/second (6) rated voltage (7) rated power (8) armature ampere-turns per pole that needed to be compensated for in order to avoid flux distortions in the air gap (9) number of turns of compensating winding per pole. (10) **With reasoning** suggest a suitable type of the armature winding and a value for the degree of multiplicity. *[25 marks]*

Question 5: [12 Marks]

The no-load magnetization curve of a 500-V, flat long-shunt compound generator is as follows::

A T / p o l e	6000	6800	7000	8000	9000
E.M.F-Volts	4 5 5	5 0 0	5 1 0	5 4 0	5 5 5

The armature resistance is 0.05 ohms. The demagnetizing effect of armature reaction at a full-load armature current of 200-A is 1000 AT/Pole. The field circuit-resistance is 250 ohms. Find the number of turns of series winding per pole. Neglect the demagnetizing effect of armature reaction at no-load, the voltage drop due to armature circuit-resistance at no load and any resistance variation. *[12 marks]*

End of Exam.

BEST WISHES

الكترونيات القوى ١

Tanta University

Electrical Power and Machines Department

Faculty Of Engineering

FINAL EXAM 2012/2013 - Second Term

Course	Power Electronics (1) (EPM2209)	Time	3 hours
Students	Second year (Electrical Power and Machines)	Marks	75
Date	30 / 5 / 2013	Number of pages	2

Answer ALL the following questions:

- *Clarify your answer with the suitable sketches as you can.*
- *Assume any missed data reasonably.*

The first question (15 marks)	
A	What are the advantages of a three-phase rectifier over a single-phase rectifier?
B	A single-phase half wave rectifier is used to charge a battery of 20 V with capacity of 200 W-h. The average charging current should be I_{dc}=10 A . If the input voltage is 120 V is connected to rectifier transformer with 1:1. Calculate: (a) the diode conduction angle. (b) the value of resistance that connected in series with the battery to maintain the average value of output current at 10 A. (c) the charging time in hours. (d) the power losses through connected resistance. (e) the circuit efficiency. (f) input power factor.
The second question (15 marks)	
A	A three-phase bridge rectifier is required to supply an average voltage of 500 V at a ripple free current of 50 A. Determine the following: (a) the supply voltage; (b) the rms value of supply current; (c) the average and rms of diode current; (g) plot the current waveform of D_1, D_4 and phase A.

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The third question (15 marks)	
A	Discuss briefly the methods used to improve the system input power factor?
B	Single-phase semiconverter is used to feed a highly inductive load with resistance of 5 ohm and battery with E=24 V. If the supply voltage is 220 V and the converter delay angle is 45^{o}, determine: (a) Average and rms value of output voltage; (b) the average and rms value of output current; (c) the average and rms value of thyristor currents; (d) the maximum inverse voltage, the transformer utilization factor and the input power factor.
The fourth question (15 marks)	
	Single phase series full converter is connected to feed a resistive load of 30 ohm. The supply voltage is 220 V and N_p: N_s = 2:1. If the average output voltage is 70 % of the maximum possible average output voltage, calculate: (a) the delay angles of the converters; (b) the rms and average load voltage; (c) the rms and average SCR currents; (d) the input power factor and TUF.
The fifth question (15 marks)	
A	Derive an expression for reduction of output voltage due to Commutation for a three-phase full controlled rectifier.
B	A three phase thyristors bridge is operated from three-phase Y-connected 380V, 50 Hz supply and used to feed a highly inductive load with 10 ohm resistor. If it is required to obtain an output power of 20 kW, calculate: (a) the converter delay angle; (b) rms and average output currents; (c) the average and rms SCR currents; (d) Rectifier efficiency, transformer utilization factor and input power factor.

Good Luck and best wishes
Dr. Doaa Mokhtar Yehia
Dr. Abd El-Wahab Hassan

Course Title: Engineering Mathematics (3) b — Second Year (Power&Machines Department)
Course Code: PME2109 — Date: 2 / 6 / 2013 (Second term) — Allowed time: 3 hrs — No. of Pages: (2)

Remarks: (Answer the following questions. Assume any missing data…)

Problem number 1(15 Marks)

(a) Find all values of $(1+i)^{1+i}$.

(b) Show that if f(z) is analytic then $\Delta^2 |f(z)|^2 = 4\left|\frac{df(z)}{dz}\right|^2$

(c) Show that if $f(z)=u(r,\theta)+iv(r,\theta)$ is analytic, then $r^2 u_{rr} + r u_r + u_{\theta\theta} = 0$.

Problem number 2(20 Marks)

(a)Evaluate (i) $\oint_C \frac{z^3+1}{(z-1)(z-5)}dz$, $C:|z|=3$. (ii) $\oint_C \frac{\sinh 3z}{(z-1)^4}dz$, $C:|z-1|=3$.

(iii) $\oint_{|z|=3} z^2 \cosh\left(\frac{3}{z-1}\right)dz$

(b)Find Taylor expansion of $f(z)=\frac{z}{2-z}$ on the region $|Z|\le 2$ and using it to find

$$\sum_{n=1} \frac{r^n}{2^n}\cos n\theta \ , \ \sum_{n=1} \frac{r^n}{2^n}\sin n\theta$$

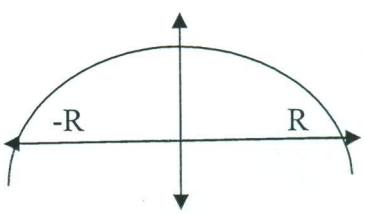
(c) Find Laurent's expansion of $f(z)=\frac{1}{z^2-3z+2}$ on the regions

(i) $1<|z|<2$ (ii) $1<|z-1|$

Problem number 3(15 Marks)

(a)Evaluate

$\int_{-\infty}^{\infty} \frac{x+1}{x^4+4}dz$ On the contour and $R\to\infty$



(b)Show that $f(z) = z^n$ is analytic and use Cauchy Reiman inequality to find f ` (z) .

(c) Find an analytic function whose real part is $u(x,y) = x^3y - y^3x$.

Problem number 4 (35 Marks)

(a) Evaluate the following integrals:

1) $\int_0^1 \sqrt{Ln(\frac{1}{x})}\, dx$ 2) $\int_0^\infty x^2 3^{-x}\, dx$ 3) $\int_0^a y^4\sqrt{a^2-y^2}\, dy$

(b) Prove that: 1) $\int_0^1 \frac{x^n}{\sqrt{1-x^2}}\, dx = \frac{\sqrt{\pi}}{2}\frac{\Gamma(\frac{n+1}{2})}{\Gamma(\frac{n+2}{2})}$

2) $\beta(n+\frac{1}{2}, \frac{1}{2}) = \frac{1*3*5*.....*(2n-1)}{2^n\, n!}\,\pi, \qquad n = 0, 1, 2, \ldots\ldots\ldots$

(c) Find the series solution of the D.E. $x^2y'' + xy' + (x^2 - \frac{4}{9})y = 0$

(d) Prove that: 1) $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\, cosx$ 2) $\int_0^1 x^3 J_0(x)\, dx = 2J_0(1) - 3J_1(1)$

3) $\frac{d}{dx}(x\, J_n J_{n+1}) = x\,(J_n^2 - J_{(n+1)}^2)$

End

All best wishes

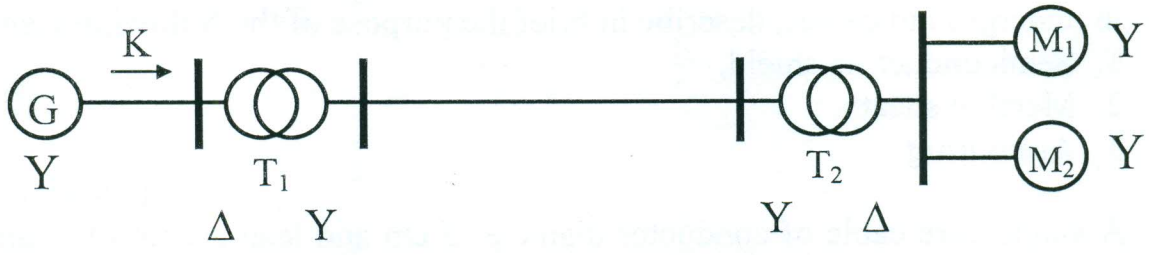
Dr .M. Shokry, Dr. Assem Elshenawy and the committee

Title: Electric power engineering (2)	**Course Code: EPM2207**	**Year: Second year**
Date: 6/6/2013	**Allowed time: 3 hr**	**No. of Pages: (2)**

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

a) Sketch the combined sending and receiving-end power circle diagram for leading power factor and explain in details how you can use it to determine the operating conditions of the transmission line. (15)

b) A 300 MVA, 20 kV three-phase generator with a reactance of 20% supplies two motors over 64-km transmission line having transformers at both ends as shown in the figure. The motors are rated at 13.2 kV with rated power of 200 MVA and 100 MVA for M_1 and M_2, respectively and for both motors, X= 20%. The three phase transformer T_1 is rated 350 MVA, 230/20 kV with leakage reactance of 10%. Transformer T_2 is composed of three single-phase transformers each rated 127/13.2 kV, 100 MVA with leakage reactance of 10%. Series reactance of the transmission line is 0.5 Ω/km. Draw the impedance diagram, with all impedances marked in per-unit. Select the generator rating as base in the generator circuit. (15)



c) A small power system has the following bus admittance matrix.

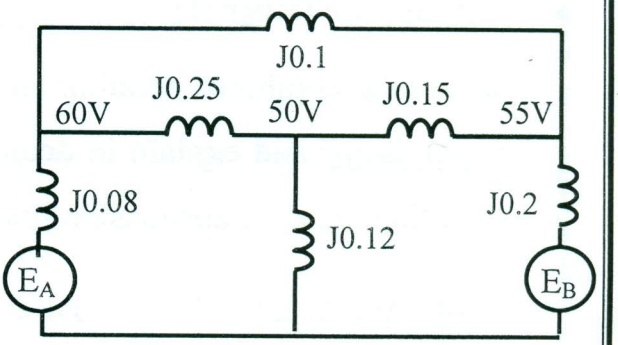
$$\left[\begin{array}{cc:cc} -j9.8 & 0.0 & j4.0 & j5.0 \\ 0.0 & -j8.3 & j2.5 & j5.0 \\ \hdashline j4.0 & j2.5 & -j14.5 & j8.0 \\ j5.0 & j5.0 & j8.0 & -j18.0 \end{array}\right]$$

Use matrix elimination technique to eliminate nodes 3 and 4. Draw the equivalent circuit of the reduced network. (15)

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

a) State the main factors affecting the reactive power in power systems and discuss the different methods by which the network voltage can be controlled. (15)

b) For the circuit shown, derive the bus admittance matrix, Y_{bus} and calculate the output currents from the two sources. (15)



c) Derive the condition of the optimal correction of power factor (15)

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

a) Mention four advantages of HVDC transmission. (4 Marks)

b) Describe with the aid of sketches the following: (6 Marks)
1. Homopolar HVDC link.
2. Back-to-back way of HVDC connection.

c) Derive an expression for insulation resistance in single core cables. (5 Marks)

d) Explain how to get the effective capacitance of 3-core bolted type cables. (5 Marks)

e) In underground cables, describe in brief the purpose of the following elements:
1. Semiconducting shield.
2. Metallic sheath.
3. Armouring.

(3 Marks)

f) A single core cable of conductor diameter 3 cm and lead sheath of diameter 9 cm. the cable is graded by using two dielectrics of relative permittivity 5 and 4 respectively with corresponding maximum working stresses 30 kV/cm and 30 kV/cm. Calculate the radial thickness of each insulation and the working voltage of the cable. (7 Marks)

Good Luck

Course Examination Committee

Dr. Ahmed Refaat Azmy

Dr. Mohamed Abouel Azm

Dr. Diaa-Eldin Mansour

محطات قوى ميكانيكية

Tanta University
Faculty of Engineering
Electrical Power Eng. Dep.

Mechanical Power Stations
Code: MEP 2244
Time: 3 h

Final Exam (9 / 6 / 2013)

1-a-prove that the thermal efficiency of Otto is larger than that Dual, and the efficiency of Dual larger than that diesel for the same compression ratio.

1-b Four kilograms of a certain gas is contained within a piston–cylinder assembly. The gas undergoes a process for which the pressure–volume relationship is $PV^{1.5}$ = constant

The initial pressure is 3 bar, the initial volume is 0.1 m^3, and the final volume is 0.2 m^3. The change in specific internal energy u2– u1 =4.6 kJ/kg. There are no significant changes in kinetic or potential energy. Determine the net heat transfer for the process, in kJ.

2-An inventor claims to have developed a power cycle capable of delivering a net work output of 410 kJ for an energy input by heat transfer of 1000 kJ. The system undergoing the cycle receives the heat transfer from hot gases at a temperature of 500K and discharges energy by heat transfer to the atmosphere at 300 K. Evaluate this claim.

3- Steam is the working fluid in an ideal Rankine cycle. Saturated vapor enters the turbine at 8.0 MPa and saturated liquid exits the condenser at a pressure of 0.008 MPa. The net power output of the cycle is 100 MW. Determine for the cycle

(a) the thermal efficiency, (b) the back work ratio,

(c) the mass flow rate of the steam, in kg/h, (d) the rate of heat transfer Q_{in}, , into the working fluid as it passes through the boiler, in MW, (e) the rate of heat transfer Q_{out}, from the condensing steam as it passes through the condenser, in MW, (f) the mass flow rate of the condenser cooling water, in kg/ h, if cooling water enters the condenser at 15C and exits at 35C.

4- An ideal Otto cycle has a compression ratio of 8. At the beginning of the compression process, air is at 100 kPa and 17°C, and 800 kJ/kg of heat is transferred to air during the constant-volume heat-addition process. Accounting for the variation of specific heats of air with temperature, determine (a) the maximum temperature and pressure that occur during the cycle, (b) the net work output, (c) the thermal efficiency, and (d) the mean effective pressure for the cycle

5- A steam power plant operates on the ideal reheat Rankine cycle. Steam enters the high pressure turbine at 8 MPa and 500°C and leaves at 3 MPa. Steam is then reheated at constant pressure to 500°C before it expands to 20 kPa in the low-pressure turbine. Determine the turbine work output, in kJ/kg, and the thermal efficiency of the cycle. Also, show the cycle on a *T-s* diagram with respect to saturation lines.

6- The compression ratio of an ideal dual cycle is 14. Air is at 100 kPa and 300 K at the beginning of the compression process and at 2200 K at the end of the heat-addition process. Heat transfer to air takes place partly at constant volume and partly at constant pressure, and it amounts to 1520.4 kJ/kg. Assuming variable specific heats for air, determine (*a*) the fraction of heat transferred at constant volume and (*b*) the thermal efficiency of the cycle