Tanta University

Department: Engineering Physics and Mathematics
Total Marks: 70 Marks

Faculty of Engineering

Course Title: Mathematics (3B)	Course Code: PME2209	Year: 2nd(Power &Machines Dep.)
Date: May 26, 2018 (Second term)	Allowed time: 3 Hrs .	No. of Pages: (2)

SOLVE THE FOLLOWING QUESTIONS

QUESTION NUMBER 1 [35 MARKS]

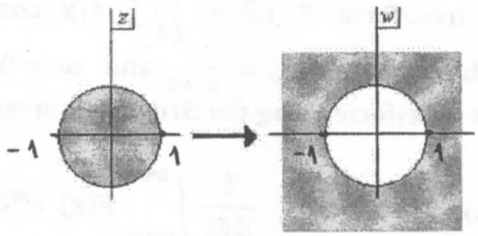
a) Find all complex numbers for which the statement $\bar{z} = z^{-1}$ is true.

b) Represent graphically the set of singular points of the function $f(z) = coth\sqrt{z\bar{z}}$.

c) A map transforms the circumference and interior of the unit circle, centred at the origin of the z-plane onto the circumference and exterior of the unit circle, centred at the origin of the w-plane as shown in the following figure,

i) Find the mapping if the points +1 and –1 are fixed points.

ii) What are the images of $z = i$ and $z = -i$ under this mapping.



d) Evaluate $\oint_C cotz\, dz$, where C is the rectangular contour with vertices $z_1 = 10 + i$, $z_2 = -4 + i$, $z_3 = -4 - i$, and $z_4 = 10 - i$.

e) Using Rouche's theorem to find the number of roots inside the contour C :$|z| = 1$, for $f(z) = e^z - 4z - 1 = 0$.

f) Use Nyquist's diagram to test the stability of an engineering system having the characteristic equation $f(z) = z^3 + 6z^2 + 9z + 6 = 0$.

g) Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3sin\,\theta}$.

QUESTION NUMBER 2 [20 MARKS]

a) Calculate $\Gamma\left(-\frac{3}{2}\right)$ and $\beta(\frac{3}{2},\frac{7}{2})$ and evaluate $\int_0^1 \sqrt{\text{Ln}(\frac{1}{x})}\, dx$.

b) Using the Gamma function identity $\Gamma(z)\Gamma(1-z) = \frac{\pi}{\sin \pi z}$ to prove that $|\Gamma(in)| = \sqrt{\frac{\pi}{n \sinh(\pi n)}}$ and sketch $\Gamma(n)$ and $|\Gamma(in)|$ versus n, where $n \in \mathbb{R}$ and $i^2 = -1$.

c) Obtain the power series solution for the following second order linear O.D.Es

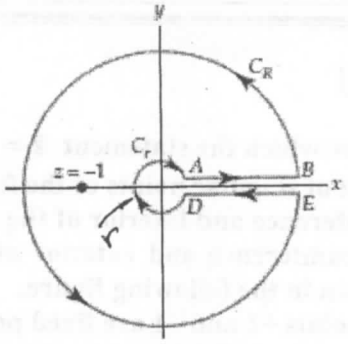
i- $(1 + x^2)y'' - 4xy' + 6y = 0$ near the point x=0, with $y(0) = 1, y'(0) = 1$.

ii- $4xy'' + 2y' + y = 0$ near the point x=0.

P.T.O

QUESTION NUMBER 3 [15 MARKS]

a) Evaluate $\int_0^\infty \frac{dx}{\sqrt{x}(x+1)}$ in the Cauchy principal value sense using the following contour when $r \to 0$ and $R \to \infty$.

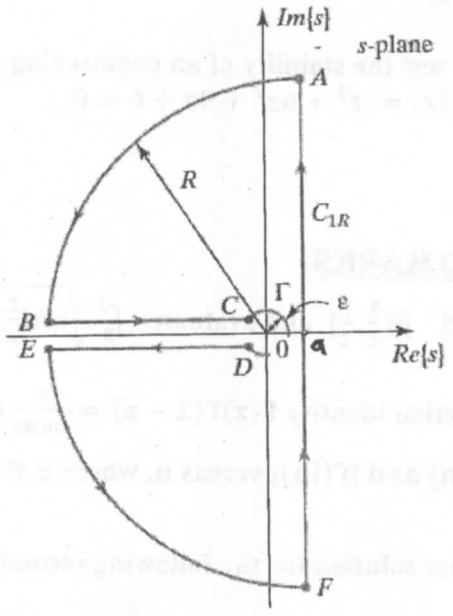


b) Find the Cosine Fourier transform $F_c(\omega) = \sqrt{\frac{2}{\pi}} \int_0^\infty f(x) \cos\omega x \, dx$ in the Cauchy principal value sense if the function $f(x) = \frac{x}{x^2+9}$ and $\omega > 0$.

c) Find the inverse Laplace transform using the Bromwich inversion theorem

$$f(t) = L^{-1}\{F(s)\} = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} F(s)\, e^{st} ds$$

in the Cauchy principal value sense if $F(s) = \frac{1}{\sqrt[7]{s}}$ using the following modified Bromwich contour when $\epsilon \to 0$ and $R \to \infty$.



ALL THE BEST
DR.ENG.MOHAMED ELBORHAMY AND THE COMMITTEE

Tanta University	Department of Electrical Power and Machines Engineering	Faculty of Engineering

Final-Term Exam 2017/2018		
2nd Year: Electrical Power and Machines Engineering	**Time: 3 hours**	**Mark: 120**
Date: Wednesday: May 30, 2018	**Course: Electric Machines (1)**	**Code: EPM2208**

Question one [20 Marks]

[a] In the process of "*commutation in a simple four-loop DC machine*", **define** the process of commutation then:

i. **Plot** a four-loop, two-pole dc machine at $\omega t = 90^{\circ}$.
ii. **Derive** the voltage at the brushes of the machine at this position.
iii. **Plot** the resulting output voltage on the rotor conductors of the machine at all positions. **[5 Marks]**

[b] **Explain**, with accurate figures for the flux and magnetomotive force under the pole faces in a dc machine, the flux weakening problem caused by armature reaction. **[5 Marks]**

[c] The following information is given about a simple rotating loop between curved pole faces for a dc machine connected to a battery via commutator and brushes: **[5 Marks]**

$B = 0.4\ T$	$l = 0.5\ m$	$r = 0.25\ m$	$V_B = 48\ V$	$R = 0.4\ \Omega$	$\omega = 500$ rad/s

i. Is this machine operating as a motor or a generator? Explain.
ii. What is the current flowing into or out of the machine?
iii. If the speed of the rotor were changed to 550 rad/s, what would happen to the current flow into or out of the machine?
iv. If the speed of the rotor were changed to 450 rad/s, what would happen to the current flow into or out of the machine?

[d] A 4-pole, 25 hp, 500 V, 600 rpm, series dc motor has an efficiency of 82%. The pole faces are square and the ratio of pole arc to pole pitch is 0.67. Assuming an average gap density of 0.55 Wb/m^2, and ampere conductors per metre as 17000. Obtain the main dimensions of the core and particulars of a suitable armature windings (type of windings, armature conductors, armature slots, commutator design, and slot design). **[5 Marks]**

Question Two [35 Marks]

[a] Explain, with all necessary equations and figures, the voltage buildup in a shunt DC generator. What if a shunt generator is started and no voltage builds up? What could be wrong? **[7 Marks]**

[b] With all necessary equations and figures, why series DC generators are used for arc welding? **[6 Marks]**

[c] Explain, with all necessary equations and figures, how a diverter resistor makes it possible to realize all the voltage characteristics of cumulatively compounded DC generator? **[6Marks]**

[d] Explain, with all necessary equations and figures, the graphical analysis (or derivation) of the terminal characteristic of a differentially compounded DC generator. **[6 Marks]**

[e] The magnetization curve for a shunt DC generator is shown in Figure 1. This curve was taken at a speed of 1800 r/min. The generator is rated at 6 kW, 120 V, 50 A, and 1800 r/min. Its field circuit is rated at 5A. The data of the machine: $R_A = 0.18\ \Omega, R_F = 20\ \Omega, R_{adj} = 0\ to\ 40\ \Omega, N_F = 1000$ turns/pole. The shunt field resistor R_{adj} is adjusted to 10 Ω, and the generator's speed is 1800 r/min. Plot the curve then: **[10 Marks]**

i. What is the no-load terminal voltage of the generator?
ii. Assuming no armature reaction, what is the terminal voltage of the generator with an armature current of 20 A? 40 A?
iii. Assuming an armature reaction equal to 300 A·turns at full load, what is the terminal voltage of the generator with an armature current of 20 A? 40 A?

Question Three [26 Marks]

[a] Explain why the induced emf in a dc motor is called back- or counter-emf. Show why the counter-emf is slightly less than the applied supply voltage. What determines the magnitude and polarity of the counter-emf? (4 Marks)

[b] What effect does armature reaction have on the torque-speed characteristic of a shunt dc motor? Can the effects of armature reaction be serious? (4 Marks)

[c] Summarize the advantages of a dc cumulative compound motor over other dc motors types. (2 Marks)

[d] A dc shunt motor operating from a 230 V line, draws a full-load armature current of 46.5 A and runs at a speed of 1300 rpm at both no-load and full-load conditions. The armature-circuit resistance (including brushes) equals 0.17 Ω and the shunt-field turns per pole is 1500 turns. The magnetization curve taken at 1300 rpm is (16 Marks)

E, V	180	200	220	240	250
If, A	0.98	1.15	1.46	1.93	2.27

i. Determine the shunt-field current of this motor at no-load. Assume negligible armature-circuit resistance and armature reaction at no-load.
ii. Determine the effective armature reaction at full load in ampere-turns per pole. What is the motor full-load speed if the armature reaction is neglected?
iii. Determine the full-load efficiency and shaft torque. Assume the rotational losses equal 5% of the armature power at full-load conditions.
iv. How many series-field turns should be added to make this machine a long-shunt cumulatively compounded motor whose speed will be 1210 rpm when the armature current is 46.5 A and the applied voltage is 230 V? Assume that the series field has a resistance of 0.038 Ω.

Question Four [24 Marks]

[a] Derive an expression from which the speed-torque characteristics of a dc series motor can be obtained. Sketch these characteristics. Summarize the main advantages and disadvantages of this motor type. (4 Marks)

[b] Explain, aided with suitable sketches, the different control methods used to control the speed of a separately-excited dc motor. Show the speed control range and the limitations of each one. (6 Marks)

[c] Explain briefly why a dc motor should not be started by impressing its rated voltage across the armature terminals. (2 Marks)

[d] A 200 V, dc shunt motor drives a constant-torque load at a speed of 1250 rpm. The armature and field resistances are 2.2 Ω and 160 Ω, respectively. The motor draws a line current of 12 A. Assume negligible rotational losses and armature reaction effect. (12 Marks)

i. Illustrate, with suitable calculations, the appropriate control methods if the motor is to be operated at 600 rpm.
ii. Determine the motor speed if the field current is reduced the by 25 %.
iii. Determine the value of the external resistance (total value ONLY) needed in series with the armature to limit the starting current to 1.5 times full-load line current.

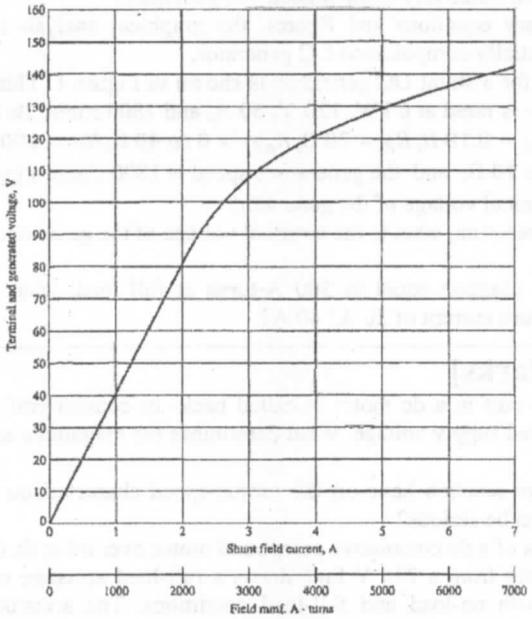


Figure 1. The magnetization curve for DC generator.

With Best Regards ..... ***Dr. Abdelsalam Ahmed*** & ***Dr. Said Allam***

Tanta University		Department: Electrical Power and Machine Engineering		Faculty of Engineering
Course Title: Mechanical Power Station		Course Code: MEP 2242		2th year
Date: 2 – 6 – 2018	Allowed time: 3 hr	Full Marks: (75)		No of Pages: 2
Name: Prof. Dr. A. E. kabeel				Final Exam

Answer the following questions: Assume any necessary assumptions.

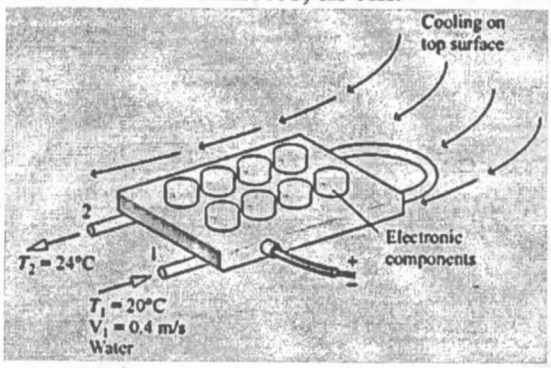
يسمح باستخدام جداول و خرايط البخار

Marks

Question No. 1

a) Calculate the work done in a piston cylinder arrangement during the expansion process where the volume changes from 1 m^3. To 41 m^3 and the process is given by the equation: $P = (V^2+5 \cdot V)$ bar. (15)

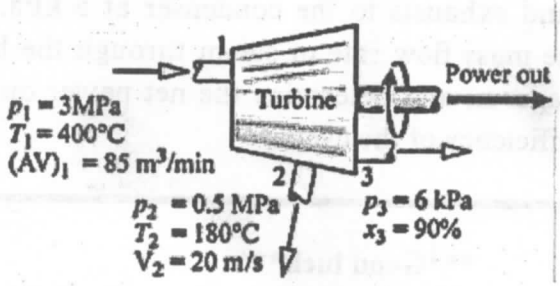
b) As shown in Fig., electronic components mounted on a flat plate are cooled by air flowing over the top surface and by liquid water circulating through a U-tube bonded to the plate. At steady state, water enters the tube at 20 °C and a velocity of 0.4 m/s and exits at 24 °C with a negligible change in pressure. The electrical components receive 0.5 kW of electrical power. The rate of heat transfer from the top of the plate-mounted electronics is estimated to be 0.08 kW. Kinetic and potential energy effects can be ignored. Determine the tube diameter, in cm.



Question No. 2 (15)

a) How to increase the Brayton cycle efficiency.

b) A well-insulated turbine operating at steady state is sketched in Fig. Steam enters at 3MPa, 400 °C, with a volumetric flow rate of 85 m^3/min. Some steam is extracted from the turbine at a pressure of 0.5 MPa and a temperature of 180 °C. The rest expands to a pressure of 6 kPa and a quality of 90%. The total power developed by the turbine is 11400 kW. Kinetic and potential energy effects can be neglected. Determine (a) The mass flow rate of the steam at each of the two exits, in kg/h and (b) The diameter, in m, of the duct through which steam is extracted, if the velocity there is 20 m/s.



Question No. 3 (15)

a) For diesel cycle prove that:

$$\eta_{diesel} = 1 - \left(\frac{1}{r}\right)^{(\gamma-1)} \left(\frac{r_c{}^{\gamma} - 1}{\gamma(r_c - 1)}\right)$$

b) An air-standard Diesel cycle has a compression ratio of 16 and a cutoff ratio of 2. At the beginning of the compression process, air is at 95 kPa and 27°C. Accounting for the variation of specific heats with temperature, determine (a) the temperature after the heat-addition process, (b) the thermal efficiency, and (c) the mean effective pressure.

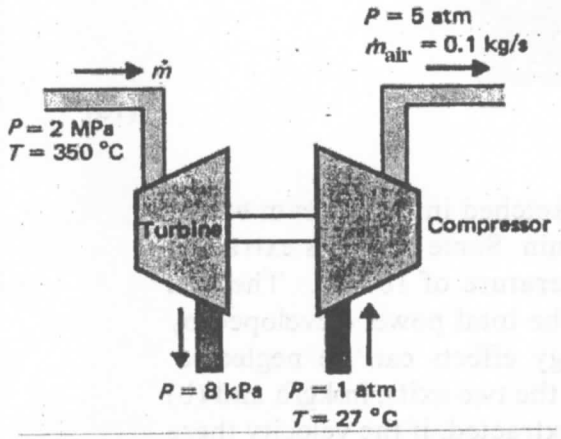
Question No. 4 (15)

a) How to improve the Rankine cycle efficiency?

b) Consider a gas-turbine cycle with two stages of compression and two stages of expansion. The pressure ratio across each stage of the compressor and turbine is 3. The air enters each stage of the compressor at 300 K and each stage of the turbine at 1200 K. Assuming an isentropic efficiency of 75 percent for the compressor and 82 percent for the turbine and an effectiveness of 65 percent for the regenerator. Determine: (a) the thermal efficiency of the cycle, (b) the mass flow rate of air through the cycle if the net power output 75 MW.

Question No. 5 (15)

a) A steam turbine with 70 percent efficiency drives an air compressor with an isentropic efficiency of 78 percent. What mass flow rate of steam must be supplied to the turbine? Assume that both devices are adiabatic.



b) A steam power plant operates on the reheat Rankine cycle. Steam enters the turbine at 10 MPa and 600 °C and exhausts to the condenser at 5 kPa. Steam is reheated at 5 MPa to 550 °C. The mass flow rate of steam through the boiler is 22 kg/s. Show the cycle on a T-s diagram, and determine the net power output of the power plant and (b) the thermal efficiency of the cycle.

Good luck

Prof. Dr. A. E. kabeel

Tanta University

Department: Elec. Power and Machines Engineering
Total Marks: 120 Marks

Faculty of Engineering

Title: Electric power engineering (2)	**Course Code: EPM2207**	**Year: Second year**
Date: 6/6/2018	**Allowed time: 3 hr**	**No. of Pages: (2)**

Answer the following questions

Problem number (1) **(40 Marks)**

a) Drive the A, B, C and D constants for the network consisting of two network in parallel. (10)

b) A three phase, 50 Hz transmission line consists of two circuits connected in parallel with the following constants:

$A1 = D1 = 0.982 \angle 1.2$ $A2 = D2 = 0.96 \angle 1.0$

$B1 = 77.3 \angle 80\ \Omega$ $B2 = 70.0 \angle 84\ \Omega$

$C1 = 0.000452 \angle 90\ \mho$ $C2 = 0.001 \angle 90\ \mho$

Find the A, B, C and D constants of the system. If the line delivers a load of 100.0 MW at 0.8 lagging power factor and 132.0 kV, draw the combined sending and receiving end power circle diagram and find:

I) The characteristics at the sending end, the efficiency and voltage regulation.

II) The maximum power transmitted, the efficiency and corresponding power factor.

III) The required reactive power at the receiving end in order to maintain both the sending and receiving end voltages equal to 132.0 kV for a load of 100.0 MW and 0.8 lagging power factor. (30)

Problem number (2) **(50 Marks)**

a) A 15000 KVA, 8.5 kV three-phase generator (G) having a reactance of 20% is connected through a delta-star transformer to a high-voltage transmission line having a total series reactance of 70 Ω. At the load end of the line is a star/star step-down transformer. Both transformer banks are composed of single-phase transformers connected for three-phase operation. Each of the three transformers composing each bank is rated 6667 kVA, 10/100 kV, with a reactance of 10%. The load, represented as impedance, is drawing 10000 kVA at 12.5 kV and 80% power factor lagging. Draw the one-line diagram and mark base kV in the three parts of the system. Then draw the impedance diagram showing all impedances in per unit. Choose a base of 10000 kVA , 12.5 kV in the load circuit. Determine the voltage at the terminals of the generator. (15)

b) A small network has an admittance matrix as shown. Eliminate node 4 and 5 from the network and write the new admittance matrix. Draw the impedance diagram of the network after node elimination. (10)

$$Y_{BUS} = j\begin{bmatrix} -30 & 0 & 20 & 10 & 0 \\ 0 & -24 & 0 & 20 & 4 \\ 20 & 0 & -70 & 0 & 50 \\ 10 & 20 & 0 & -40 & 10 \\ 0 & 4 & 50 & 10 & -64 \end{bmatrix}$$

a) A transmission line with a reactance of 6.0 Ω is used to supply a load of 10 MW at 33 kV and 0.8 power factor lagging. If it is required to use either a shunt or series capacitors for improving the voltage level at the end of the transmission line, calculate the ratio between the required reactive power in the two cases for the same voltage improvement. Comment on the results. (10)

b) A capacitor bank is used for optimal correction of a power factor in a factory. The optimal value of the power factor is found to be 0.89 with an apparent power cost of 1.2 LE/kVA. Calculate the optimal value of the power factor if the apparent power cost is increased to 1.4 LE/kVA. Discuss the importance of power factor correction. (15)

Problem number (3) (30 Marks)

a) Describe the Homopolar link of the HVDC transmission systems. Mention the main advantages of HVDC transmission systems. (10)

b) Describe the construction of underground cables in detail. (10)

c) A single core cable for 53.8 kV has a conductor of 2 cm diameter and sheath of inside diameter 5.3 cm. It is required to have two intersheaths so that stress varies between the same maximum and minimum values in three layers of dielectric. Find the positions of intersheaths, maximum and minimum stress and voltages on the intersheaths. Also, find the maximum and minimum stress if the intersheaths are not used. (10)

Good Luck

Course Examination Committee

Prof. Gamal El-din El-Saeed Prof. Ahmed Refaat Azmy

Tanta University

Department: Mechanical Power Engineering

Exam Total Marks : 35 Marks

Faculty of Engineering

Course Title: TECHNICAL WRITING	Course Code EPM22H3	Year : 2nd Electrical power
Date: June 2018 (Second Term)	Allowed Time : 2 hrs	No. of Pages: (2)

Question Number (1) **(15 MARKS)**

I. Complete the following sentences by selecting the suitable expressions from the words list shown below only: **(15 MARKS)**

1) .....is imposing a personal opinion in your writing.

2) .....Type of CV is Useful if you have limited or unrelated work experience.

3)..... is the use of another's work without permission.

4)..... Is the process of meaningful interaction between human beings.

5).....Are interpersonal performances in which concise technical information is provided to an attending audience.

6) The..... Communication network may occur between middle managers at the same level.

7) The..... Communication network can provide the best solutions to complex problems through brainstorming.

8) ..... is a set of rules and standards for using communication skills and resources with the intention of doing good.

9) Letter, Memos, Email and other Requests information transfer technical documents are from the..... Communication technical document types.

10) Proposals and feasibility reports are considered as from the.....technical document types

11) In the .....stage of report writing attention is directed to how these results should be presented.

12)During the.....stage of report writing the program conclusions should be drawn.

13) ..... are specialized, technical business documents that offer persuasive solutions to problems.

14) In the .....type of graphs values are plotted in decreasing order of relative frequency from left to right.

15)..... is a simple document that is used for collecting data in real-time and at the location where the data is generated.

Words List:

Process flow diagram - Skills - The chain network – progress report - Chronological – bias - Plagiarism- Presentations – pareto Chart -communication- The wheel network - The cycle network- – ethics –business - Planning Reports- The connected network -Deterministic Reports - The outlining stage- Analyzing and Sorting the Results- Feasibility reports –Check Sheets-Scatreted diagram-Writing the Rough Draft - The wheel network –Bibliography- - writing the rough draft- Results and discussion-

Tanta University | Department: Mechanical Power Engineering | Faculty of Engineering

Exam Total Marks : 35 Marks

Question Number (2) **(20 MARKS)**

I. **Explain the difference between (Resume – CV- covering letter).** **(3 MARKS)**

II. **Understanding the viewpoint of your audience is the key to writing effectively. Comment on the statement with clear explanations of audience types with difference needs.** **(3 MARKS)**

III. **Draw free hand schematic examples of the following illustrations used in technical writing:** **(5 MARKS)**

1. Cause-and-Effect Diagram
2. Scatter Diagram
3. Exploded Pie Chart
4. Hierarchical Organizational Chart
5.Flow chart for lamp change Process with alarm

IV. **Explain the Criteria for Effective Graphics; mention the graphics type Selection Guide.** **(4 MARKS)**

V. **To achieve effective technical document design, you'll need to provide your readers visuals in terms of (organization – Order –Access – Variety). Comment on that phrase with examples if possible.** **(3 MARKS)**

VI. **How to write a formal technical email?** **(2 MARKS)**

With my best wishes *Dr. Eng. Hagar Alm ElDin*

قوى كهربية ٢ الكترونيات القوى (١)
٢٠١٨/٦/١٣

FINAL EXAM 2017/2018 Second-term — Power Electronics (1) (EPM2209)

Tanta University	Department of Electrical Power and Machines Eng.	Faculty of Engineering

Final Exam – Second Semester 2017-2018

Year	2nd Electrical Power and Machines Eng.	**Time:**	**3 hours**
Course Title:	**Power Electronics (1)**	**Course Code:**	**EPM2209**
Date	**13 / 6 / 2018**	**Marks:**	**75**

Notes: Any data not given is to be assumed - Answer ALL the following questions

The first question

[A] State true (√) or false (×) — **15 Points (5+10)**

(Correction is A MUST for the false statement)

1) The value of transformer utilization factor (TUF) signifies that the input transformer, if present, must be TUF times larger than that when it is used to deliver power from pure ac sinusoidal waveforms.
2) The output voltage of the three-phase rectifiers contains harmonics whose frequencies are multiple of f_s (times the supply frequency).
3) If the input current is purely sinusoidal, the load power factor (PF) equals the displacement factor (DF).
4) An ideal rectifier should have $\eta = 100\%$, $V_{ac} = 0$, $RF = 0$, $TUF = 1$, $HF = 1$, and $DF = 1$.
5) The performance of the center-tapped and bridge rectifiers is exactly the same.

[B] Tick the correct *ANSWER/ANSWERS* for the following statements:

(Verification of your choice is A MUST when numerical data are given).

1) The …… factor is often interest to specify the peak current ratings of devices and components.
   a) Crest b) Ripple c) Form d) THD
2) The …… factor is a measure of the distortion of a waveform.
   a) Crest b) Ripple c) Form d) THD
3) The output of a full-wave rectifier contains only …… harmonics and the most dominant harmonic has a frequency of …….
   a) Odd, $2f_s$ b) Odd, $6f_s$ c) Even, $2f_s$ d) Even, $6f_s$
4) The power factor will depend on the …….
   a) Supply impedance b) load inductance c) firing angle d) Input current distortion
5) A multiphase rectifier ……
   a) increases the amount of dc component
   b) lowers the amount of the harmonic components
   c) lowers the supply power factor
   d) increases the crest factor
6) The three-phase bridge rectifier has …… performance compared with those of the multiphase rectifier with six pulses.
   a) the exact b) improved c) the worth d) a near
7) With highly inductive load, the input current of a rectifier becomes as ac square wave. The input power factor of a three-phase rectifier is 0.955, which is higher than 0.9 for a single-phase rectifier.
   a) 0.955, 0.95 b) 0.995, 0.95 c) 0.995, 0.9 d) 0.955, 0.9
8) In a half-wave rectifier circuit, if the diode connects the ac source to a pure inductance L. The conducts for
   a) 90° b) 180° c) 270° d) 360°

9)	In a single-phase diode bridge full-wave rectifier, the load resistor is R = 50 Ω. The source voltage is V = 200 sin(ωt), where ω = 2π50 r/s. The power dissipated in the load resistor R is a) 3200/π W b) 400/π W c) 400 W d) 800 W
10)	The rectifier efficiency of a single-phase bridge rectifier feeding an R + L load will be …… than that with a pure resistive load; also, its derating factor will be …… than that with a pure resistive load. a) more, more b) less, more c) less, less d) more, less

The second question	**20 points (4,4,12)**
[A]	Explain with aid of sketches and equations how to increase the number of pulses in the output voltages of the rectifier to twelve.
[B]	What are the main requirements of the SCR firing circuits?
[C]	For a *q*-phase *star-connected rectifier*. 1) Sketch the power circuit topology and the output voltage waveforms. 2) Express the average and RMS values of the output voltage. 3) For resistive load, determine the rectifier efficiency, form factor and ripple factor. 4) When the number of phases is three with a balanced three-phase voltage source, ***derive the commutation overlap angle*** if the per-phase source inductance is L_s and the load current is pure dc.

The third question	**13 points**
[A]	Discuss briefly the single-phase dual converter operation.
[B]	Single-phase semi-converter 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 transformer with turn's ratio of 1:1. If the converter operates at minimum firing angle. Calculate: (a) The maximum 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 fourth question (14 marks)	**14 points**
[A]	Discuss briefly the pulse width modulation method. How can you use this method to improve the system power factor?
[B]	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 80 % 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	**13 points**
[A]	Derive an expression for the phases current in a three-phase full controlled rectifier through the Commutation interval.
[B]	A three phase full converter is operated from three-phase Y-connected 380V, 50 Hz supply and used to feed a highly inductive load with 10 ohm resistor and battery with emf E = 60 V. If the input power is 1.6 kW, calculate: (a) The converter delay angle; (b) r.m.s and average output currents; (c) The average and r.m.s SCR currents; (d), T.U.F and input power factor.

Good Luck and best wishes Dr. Abdel-Wahab Hassan and Dr. Sherif Dabour