جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

المادة / وصل المواد (MPD2211)
الفرقة الثانية(إنتاج)

بسم الله الرحمن الرحيم
التاريخ : ٤ /٦/ ٢٠١٥
الزمن : ٣ ساعات

أجب عن الأسئلة الآتية:- (٧٥ درجة)

السؤال الأول:-

١- مما يتكون سيخ اللحام (الالكترود) مع شرح لأهم فوائد مساعدات الصهر المستخدمة فى اللحام٠

٢- اكتب نبذة مختصرة عن كل من :- الاستلين - الاكسجين٠

٣- لماذا يعتبر وجود كبريتيد الهيدروجين ضار فى الاستلين اذا استخدم الغاز فى اللحام٠

٤- أذكر مع الرسم أشكال الوصلات الملحومة ورموزها٠

السؤال الثانى:-

١- تكلم بالتفصيل عن مميزات وعيوب القطع الحرارى٠

٢- تكلم عن أهم العدد والادوات المستخدمة فى اللحام تحت سطح الماء٠

٣- تكلم عن اهم العوامل المؤثرة على جودة اللحام٠

السؤال الثالث:-

١- تكلم بالتفصيل عن اللحام بالاحتكاك مع التوضيح بالرسم لكل نوع٠

٢- اذكر اهم مميزات وعيوب اللحام بالقوس الكهربى (مع الرسم)٠

٣- اشرح الية انتقال المعدن من الالكترود الى الوصلة٠

٤- عند اجراء تجربة على اسطوانة استلين وجد وزنها قبل اللحام ٧٥٠ نيوتن وبعد اللحام ٦٨٠ نيوتن وسعة الاسطوانة ٥ متر ووزن المتر المكعب ١٤ نيوتن – احسب حجم الاستيلين المستهلك فى اللحام٠

السؤال الرابع:-

١- أذكر مزايا الاختبارات الغير متلفة- مع ذكر أهم العيوب التى يمكن معرفتها بالاختبارات غير المتلفة٠

٢- احسب ثمن التيارالكهربى اللازم للحام خط طوله ٦١٢مم وسرعة الانجاز ٥متر/ساعة وشدة التيار ٢١٠ أمبير وجهد ٣٥ فولت والفقد فى التيار ٤٤% وسعر الكيلووات ساعة ٥٦ فرشا ومعامل الجودة ٧٥%٠

مع أطيب التمنيات بالنجاح

Tanta University - Faculty of Engineering
Department of Production Engineering and Mechanical Design

Course title: **Furnaces and Heat Treatment**
Course code: MPD 2213
Year: 2nd – Production Engineering and Mechanical Design
2nd Term – Final Exam

Date: 14 June 2015
Total marks: 75
Time allowed: 3 hrs
No. of pages: 2

Answer all the following questions. The neat sketches are considered a part of your answer

Q1: State which of the following statements is true (✓) and which is false (✗): (10 marks)

1. High voltage DC-current is used to heat up the induction furnace coils.
2. The latent heat of fusion is taken as one of the design considerations of heat treatment furnaces.
3. For concentration of iron ore, flotation cells are used to separate the light impurities.
4. The greater the ratio $\frac{\text{surface area}}{\text{volume}}$ for the part to be austenitized, the longer the soaking time.
5. Plain carbon steel is rarely case hardened by nirtiding.

Q2: Choose the most correct answer (20 marks)

1. Excess air in fuel heated furnaces (forms diffusion flame – maximizes the heat generated – leads to incomplete combustion – reduces furnace thermal efficiency)
2. The charge of blast furnace consists of: (a) coke + limestone + pig iron; (b) coke + limestone + iron ore; (c) coke + limestone + scrap; (d) coke + limestone + sponge iron
3. Permanent jamming of cupola is mainly caused by (delay of tapping the molten metal – low furnace temperature – frequent pocking of the charge – lack of coke in charge).
4. The oxygen free steel obtained from steelmaking plant is called (killed – semi-killed – capped – rimmed) steel.
5. Eutectoid steel contains about (6.67% – 4.30% % – 2.00% – 0.79) of carbon.
6. The guide ways of lathe beds فرش المخرطة are hardened by
   (a) carburizing (b) cyaniding (c) nitriding (d) induction hardening
7. Austenite-to-pearlite transformation is considered a (diffusion – simple diffusive – meta-stable – diffusionless) solid state transformation.
8. Hardenability is
   a) A heat treatment to increase the hardness of steel
   b) The ability of steel to be hardened by quenching
   c) The resistance of the material for indentation and scratching
   d) The depth to which austenite can be transformed into pearlite
9. The most common nitriding agent is (ammonia – nitrogen – sodium carbide – sodium cyanide).
10. It was required to form 1.5 mm thick hard case on a steel shaft by carburizing. Find the required carburizing time, if the diffusion coefficient of carbon in steel is 1.705×10^{-5} cm^2/s:
    (a) 1100 min (b) 1320 min (c) 11 min (d) 15 min (e) 22 min

Q3: (5+10+5=20 marks)

1) Explain with aid of sketches the basic steps of steelmaking in BOF.

2) Differentiate briefly between the following terms

   a- Bauxite and alumina
   b- The characteristics of combustion flame with- and without-recirculation.
   c- Martempering and austempering

3) What are the causes and the consequences of residual stresses? Describe a heat treatment to relief the residual stresses.

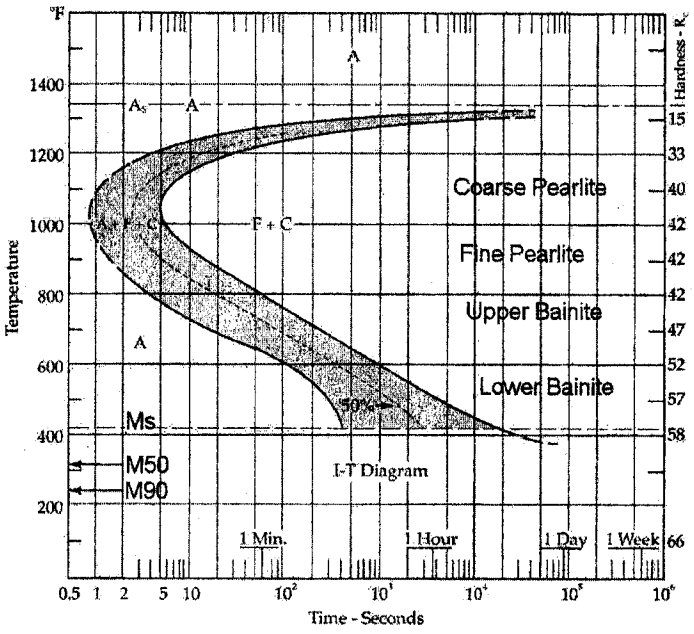
Q4: (4+6+6=16 marks)

a) Austenite decomposes to different products by cooling. Explain with sketches the effect of; the cooling rate (quench medium), the carbon content on martensite structure.

b) For the given IT-diagram draw schemati-cally the cooling paths for the following samples and find the final **microstruc-ture** and the range of **hardness values**:

   Sample (1) is cooled from 1500°F to 500°F in one second and then held at 500°F for 10hr. Finally, it is cooled to room temperature in 1hr.

   Sample (2) is cooled from 1500°F to 1000°F in 2 seconds and then held at 1000°F for one second. Finally, it is cooled to 200°F in 7 seconds.



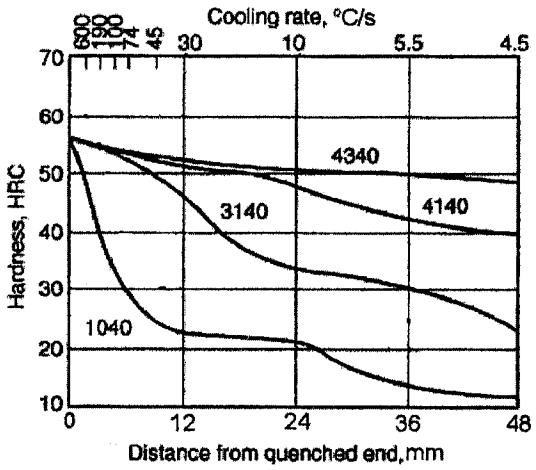
c) List the possible mechanisms of strengthening non-ferrous alloys. Describe the procedure of age hardening of Al-4%Cu alloy.

Q5: (3+4+2=9 marks)

a- Explain with the aid of sketches the principle of Jominy end-quench test for hardenability.

b- The hardenability test results of different steel samples that contain 0.4% C are shown at right. Arrange the samples according to their hardenability in a descending order. Why?

c- Given that 1040 is a plain carbon steel, whereas the other samples contain some alloying elements, in addition to the 0.4%C. Which alloying elements would you expect to find in 4340 to achieve this hardenability behaviour?



Best wishes,
Assoc. Prof. Mahmoud Ahmadein

٢٠١٥/٥/١٠

بسم الله الرحمن الرحيم

Tanta University
Engineering Faculty
2nd Year Prodution

Machine design
Mai 2015
Time : 4 hours

Answer all the following questions :

(1)- Two parallel shafts whose centre lines are 4.8 m apart, are connected by an open belt drive. The diameter of the larger pulley is 1.5 m and that of smaller pulley 1.05 m. The initial tension in the belt when stationary is 3 KN. The mass of the belt is 1.5 Kg/m length. The coefficient of friction between the belt and the pulley is 0.3. Taking centrifugal tension into account, calculate the horse power transmitted, when the smaller pulley rotates at 400 r.p.m. .

(2)- A bracket carring a load P is to be welded as shown in Fig. (1). Calculate the value of the load P if the size of the weld is 8.5 mm and the working shear stress is not to exceed 800 Kgs/cm^2.

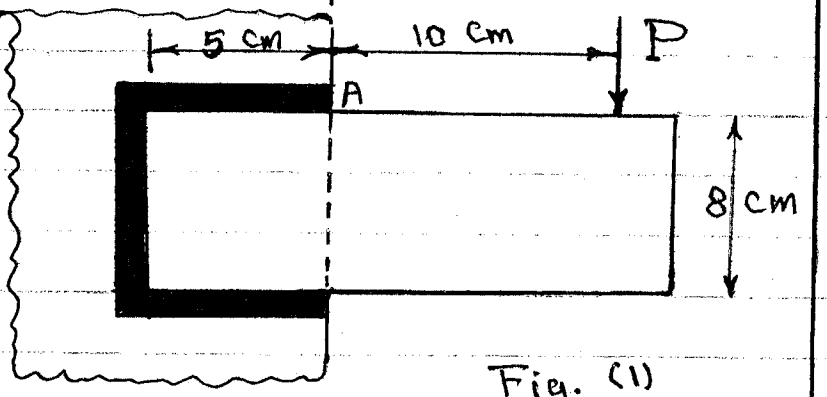


Fig. (1)

(3)- A beam ABCD is subjected to loads 50 KN & 25 KN as shown in Fig. (2). Determine the deflection at point D and determine the position of maximum deflection of the beam between point B and point C.

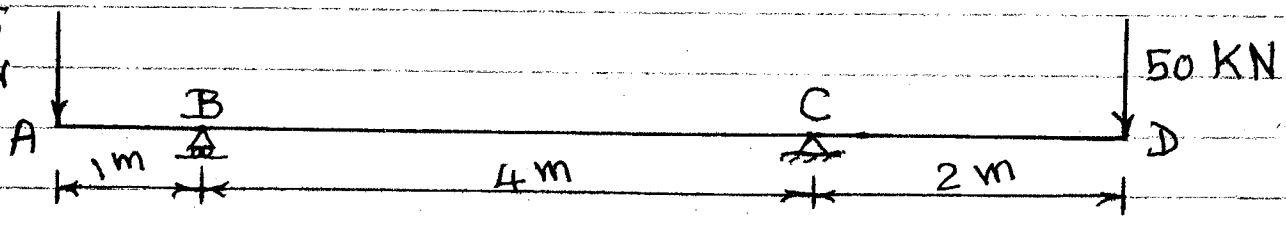


Fig. (2)

(4)- An eccentrically loaded lap riveted joint is to be designed for a steel bracket as shown in Fig. (3). The bracket plate is 25 mm thick. All rivets are to be of the same size.
rivet spacing, $C = 10$ cms,
load arm, $e = 40$ cm,
rivets size, $d = 25.5$ mm
and the permissible shear stress is $\tau_{all} = 650$ Kgs/cm^2
and crushing stress is $\sigma_{all} = 1200$ Kgs/cm^2.

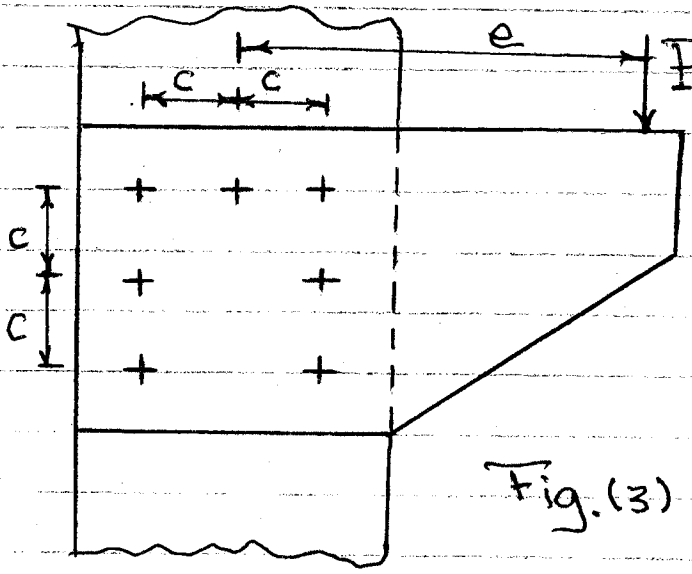


Fig. (3)

(5) - For supporting the travelling crane in a workshop, the brackets are fixed on steel columns as shown in Fig. (4). The maximum load that comes on the bracket is 1200 Kgs, acting vertically at a distance of 40 cms from the face of the column. The vertical face of the bracket is secured to a column by 4 bolts, in two rows (two in each row) at a distance of 5 cm from the lower edge of the bracket.
Determine the size of the bolts if the permissible value of the tensile stress for the bolt material is 840 Kgs/cm^2, Also find the cross-section of the arm of the bracket which is rectangular.

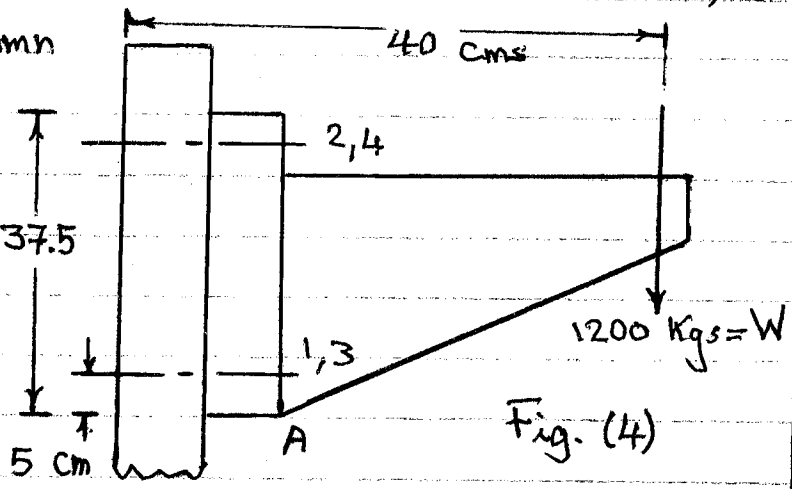


Fig. (4)

End of questions Good Luck Dr. H. Hendawy

C-10 / 7 / 2

TANTA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF MECHANICAL POWER ENGINEERING
SECOND YEAR STUDENTS OF PRODUCTION ENGINEERING & MACHINE DESIGN
COURSE TITLE: HEAT TRANSFER COURSE CODE: MEP2251
DATE: JUNE,4-2015 SECOND TERM TOTAL ASSESSMENT MARKS: 75 TIME ALLOWED : 3 HOURS

Remarks: (answer the following questions; assume any missing data, steam and heat tables and charts are allowed)

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

a) Consider a medium in which the heat conduction equation is given in its simplest form as

$$\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = \frac{1}{\alpha}\frac{\partial T}{\partial t}$$

(a) Is heat transfer steady or transient?
(b) Is heat transfer one-, two-, or three-dimensional?
(c) Is there heat generation in the medium?
(d) Is the thermal conductivity of the medium constant or variable? **(4 Marks)**

(b) Consider two surface pressed against each other. Now the air at the interface is evacuated. Will the thermal contact resistance at the interface increase or decrease as a result? **(3 Marks)**

(c) Determine the loss of heat through the wall of a sphere shaped boiling pan with an inner diameter d_i = 1.5 m and total boiler wall thickness δ = 20 cm. The inner surface temperature is 200 °C and that of the outer surface T_2= 50 °C. The equivalent thermal conductivity is 0.12 W/m.K. Also find the heat flux at inside area. **(8 Marks)**

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

a) What is a conduction shape factor? How is it related to the thermal resistance? **(3 Marks)**

b) Hot air is to be cooled as it is forced to flow through the tubes exposed to atmospheric air. Fins are to be attached in order to enhance heat transfer. Would you recommend attaching the fins inside or outside the tubes? Why? **(4 Marks)**

c) Twelve thin brass fins with thermal conductivity of 78 W/m.K. and 0.75 mm thick are placed axially on a 55 cm diameter and 50 cm long cylinder which stand vertically and is surrounded by air at 38 °C. If the fins extended 2.5 cm from the cylinder surface and the heat transfer coefficient from the fins and the cylinder to air is 22.7 W/m^2.k. What is the rate of heat transfer to the air from the cylinder when its surface is at 150 °C? **(8 Marks)**

Problem number (3) **(15 Marks)**

a) For which solid is the lumped system analysis more likely to be applicable: an actual apple or a golden apple of the same size? Why? **(5 Marks)**

b) A short brass cylinder of diameter D = 10 cm and height H = 12 cm is initially at a uniform temperature T_i = 120 °C. The cylinder is now placed in atmospheric air at 25 °C, where heat transfer takes place by convection, with a heat transfer coefficient of h = 60 w/m^2 .°C. Calculate at15 min after the start of the cooling the temperature at:

(a) the center of the cylinder.

(b) the center of the top surface of the cylinder.

(c) determine the total heat transfer from the short brass cylinder.

The properties of brass at room temperature are (ρ = 8530 kg/m^3, Cρ = 0.380 kJ/kg.°C, k = 110 W/m. °C, $\alpha = 33.9 \times 10^{-6}\ m^2/s$.). **(10 Marks)**

Problem number (4) **(15 Marks)**

a) How does radiosity for a surface differ from the emitted energy? For what kind of surfaces are these two quantities identical? **(4 Marks)**

b) How does radiation influence the temperature measurements? **(3 Marks)**

c) Consider a hemispherical furnace of diameter D = 5 m with a flat base. The dome of the furnace is black, and the base has an emissivity of 0.7. the base and the dome of the furnace are maintained at uniform temperatures of 400 and 1000 K, respectively. Determine the net rate of radiation heat transfer from the dome to the base surface during steady operation. **(8 Marks)**

Problem number (5) **(15 Marks)**

a) What are the types of heat exchangers? **(4 Marks)**

b) What are the Reynolds number and Grashof number. **(4 Marks)**

c) Water at 15 °C enters 4 cm diameter tube at a rate of 5 L/s. Determine the exit water temperature if the tube is 3.0 m long and the wall temperature is constant at 80 °C.

(7 Marks)

With my best wishes

EXAMINERS DR. ELSAYED ELSAID

٢٠١٥/٦/٧

قسم هندسة الإنتاج والتصميم الميكانيكي

جامعة طنطا – كلية الهندسة
إسم المقرر: أجهزة قياس متروولوجية
الفصل الدراسى: الثانى
زمن الإمتحان: ٣ ساعات

العام الجامعى: 2014 /2015
الفرقة : الثانية انتاج
النهاية العظمى: 85 درجة
عدد الأوراق/عدد الصفحات: ١

ملاحظات :حاول الإجابة على جميع الأسئلة و إفرض أي قيم تحتاجها

السؤال الأول (٢٥%)

١) ماهو المقصود بمعنى مترولوجي في القاموس الدولي؟
٢) اذكر مع التوضيح المختصر العناصر الاساسية لعلم القياس المترولوجي؟
٣) اشرح بإختصار العوامل المؤثرة على اختيار جهاز قياس عموما و جهاز قياس مترولوجي؟
٤) اعقد مقارنة بين طرق قياس الابعاد باستخدام قدمة و ميكرومتر من حيث الدقة – النوع – طريقة القياس – ابعاد الجسم المراد قياسه – سهولة القياس – الاكثر تكرارية؟
٥) اذكر على الأقل ٨ طرق لقياس الابعاد لمشغولة معينة؟

السؤال الثانى (٢٥%)

١) عرف بإختصار ماهي قوالب القياس وماهي انواعها وماهي أعلى دقة يمكن ان تصنع بها ؟
٢) وضح الطريقة العملية لقياس البعد ١٧.٧٤٥ بواسطة قوالب القياس؟
٣) اشرح بإختصار انواع محددات القياس مع ذكر امثلة لكل نوع؟
٤) وضح الفرق بين قوالب القياس و محددات القياس وساعات القياس ؟
٥) اشرح بإختصار العناصر الاساسية في جهاز قياس وطبق ذلك على القدمة و ساعة القياس ومحددات القياس وميزان حساس رقمي و قوالب القياس؟

السؤال الثالث(٣٥%)

١) اذكر بإختصار مصادر الأخطاء مع اعطاء مثال توضيحي؟
٢) لديك زجاجة مخبار بها ماء الوزن النوعي له ١جم وزن لكل ١سم مكعب وكان ارتفاع الماء فيه ٢٠٠ مم وكذلك لديك مخروط ناقص مجوف قاعدته الصغرى قطرها ٧ سم مغلقة و القاعدة الكبرى قطرها ١٥سم و ارتفاعه ٢٠ سم. وضع المخروط في المخبار بحيث كانت قاعدته الصغرى الى اسفل فغاص مقدار ٥سم ثم تم ملؤه تماما بسائل غير معلوم الكثافة فغاص مقدار ١٥ سم. اوجد الوزن النوعي للسائل ونسبة الخطأ في حساب الحجم لكل من الخروط و الماء المزاح. اذا علمت ان كل الارتفاعات تم قياسها بدقة ١ مم و الاقطار تم قياسها بدقة ٠.١ مم (مع اهمال الخطأ في حساب الوزن النوعي للماء)

السؤال الرابع (٢٥%)

١) اشرح بإختصار عملية معايرة لجهاز LVDT واحسب نسبة الخطأ في اكبر قرأة له اذا علمت ان نسبة الخطأ في قرأة الأفوميتر ٠.٠٢% وقيمة الفوات العظمى ١٠ فولت، و ان نسبة الخطأ في قرأة المسافات ٠.١% و الطول الكلي المقاس ٥سم.
٢) لديك ميزان حساس رقمي اكبر وزن يمكنه قرأته هو ١ كجم و المطلوب حفظ قرأة الميزان على حاسب آلي لذا كان المطلوب ان يتم رفع اشارته الى اشارة تناظرية اقصى قيمة لها ٥ فولت. فأذا علمت ان خلية التحميل التي بالميزان لها حساسية 5mV/V وكان الفولت الداخل للوحدة هو 10V (excitation volte) فما هي قدرة التكبير المراد وضعها على اشارة؟ واذا كانت قرأة الفولت بع التكبير 3.75V فما هو الوزن المناظر لهذه القيمة.

C.10 17/11

TANTAUNIVERSITY

Electrical Power and Machines Engineering Department

Faculty Of Engineering

Final EXAM 2014/2015 - Second Term

Course	Electrical Machines(EPM2244)	Time Allowed	3 hours
Students	2nd Year (Production Engineering and Mechanical Design)	Total Mark	85
Date	11 / 6/2015	Number of page	1

Answer ALL the following questions:

The first question (17 marks)	
A	Explain the procedure of voltage building in self-excited generator.
B	A 50 kW, 250 V series generator has an armature resistance of 0.02Ω and series field resistance of 0.045Ω The stray losses are 2.5 kW. At rated load. Calculate: a) Armature current. d) Generated voltage. b) Armature copper losses. e) Field copper losses. c) The generator efficiency.
The second question (17 marks)	
A	Why a d.c. series motor cannot be started on no load?
B	A 250V d.c shunt motor has a shunt field resistance of 200 ohm and armature resistance of 0.3 ohm. For a given load, motor runs at 1500 r. p. m. drawing a current of 22 A from the supply. If a resistance of 150 ohm is added in series with the field winding, find the new armature current and speed. Assume load torque constant and magnetization curve to be linear.
The third question (17 marks)	
A 5KVA, 500/250 V, 50 Hz, single-phase transformer gave the following readings, Open circuit test : 500 V, 1 A, 50 W (L.V. side open) Short circuit test : 25 V, 10 A, 60 W (L.V. side shorted)Determine a- The efficiency on full load, 0.8 lagging power factor. b- The voltage regulation on full load, 0.8 leading power factor. c- The efficiency on 60% full load, 0.8 leading power factor. d- Draw the equivalent circuit referred to primary and insert all the values in it.	
The fourth question (17 marks)	
A	1- A three-phase induction motor does not run at synchronous speed. Why? 2- List out the names of starters used for three-phase induction motor.
B	A 3-phase, 20hp, 500V, 50Hz, 6-pole, star connected induction motor running at 950rpm with 0.85 lagging power factor. The mechanical losses are 1hp, the stator copper losses are 1500W, while the core losses are 500W. Calculate: a- The rotor copper losses c- The line current b- Motor efficiency d- The slip
The fifth question (17 marks)	
A	1- State the various types of single-phase induction motor. 2- Draw the phasor diagram of three-phase synchronous generator at lag power factor, lead power factor and unity power factor
. B	A 3-phase, star connected, 6-pole synchronous generator supplies a 3-phase load of 100 kW, 0.8 leading power factor at 60 Hz, 2kV line voltage. The machine per phase armature resistance & reactance are 0.4Ω & 4Ω respectively Find: a)Voltage regulation b) Maximum developed power c) Efficiency if P_r =10 kW

Good Luck and best wishes

Dr. Abdelwahab Hassan