

Course Title: Design tools and production aids
Date: Jun 1st 2013 (Second term)

Course Code: MPD4233
Allowed time: 3 hrs

Year: 4th
No. of Pages: (1)

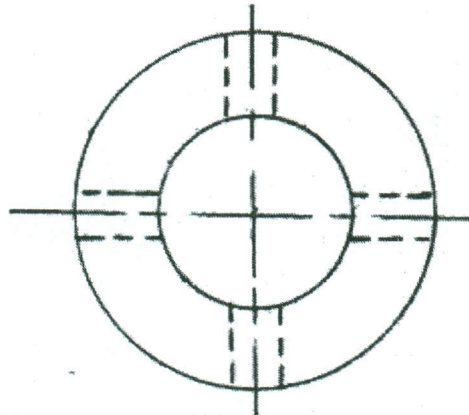
Remarks: (answer the following questions... assume any missing data... answers should be supported by sketches) اجب عن الاسئلة الاتية - افرض اي بيانات غير موجودة - يجب ان تكون الاجابة مدعمة بالاستكثشات

Problem number (1) (20 Marks)

- a) Explain briefly main elements of jig and fixture? (5 Marks)
 b) Explain with neat sketch: dowels, tenons and spigots locator device? (5 Marks)
 c) Explain the function of fool proofing? (5 Marks)
 d) What are the differences between the channel and box jigs? (5 Marks)

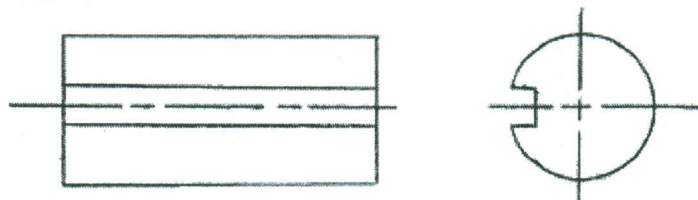
Problem number (2) (25 Marks)

- a) What is meant by 3-2-1 principle of location? (5 Marks)
 b) What is advantage of conical locators? (5 Marks)
 c) Explain the function of fool proofing? (5 Marks)
 d) Design the drill jig for four equispaced through holes has to be drilled radially in disc (like rotor of radial piston pump) as shown in Figure below. A jig is to be designed for batch production of such discs. (10 Marks)



Problem number (3) (25 Marks)

- a) Explain the fixture of rectangular and circular components? (10 Marks)
 b) A through rectangular section slot has to be cut on a rod as shown in Figure below. Design fixture for cutting the slot in batch production. (15 Marks)



Problem number (4) (30 Marks)

- a) Explain the types of clearance should be studied before design fixture of shearing? (5 Marks)
 b) Distinguish between Explosive forming and Die Swell? (5 Marks)
 c) Explain the redrawing types (direct-indirect)? (5 Marks)
 d) In extrusion: Explain how can you get hollow shapes? (5 Marks)
 e) Explain the injection molding machine (injection unit and cycle- functions of clamping unit? (10 Marks)

بسم الله الرحمن الرحيم
التاريخ : ٢٠١٣/٥/٢٧
الزمن : ٣ ساعات

المادة/ ادارة الجودة الشاملة
(EPM32H4)
الفرقة الرابعة انتاج (حديث)

جامعة طنطا
كلية الهندسة
قسم هندسة الإنتاج والتصميم الميكانيكي

أجب عن الأسئلة الآتية:- (٨٥ درجة)

السؤال الأول:- (١٥ درجة)

- ١- ما المقصود بمفهوم الاستثمار- وما أهميته؟
- ٢- اكتب نبذة مختصرة عن الجدوى المالية للمشروع.
- ٣- تكلم بالتفصيل عن عناصر التصنيع.

السؤال الثاني:- (٢٠ درجة)

- ١- يمكن تقسيم المصنع على حسب طرق عمليات الانتاج والتخطيط الى ثلاثة أقسام رئيسية اكتب نبذة مختصرة عن هذه الأقسام.
- ٢- تكلم عن أهم:-
 - (أ)- العوامل المؤثرة في حجم مرونة الطلب.
 - (ب)- العوامل التي يترتب عليها نقصان أو زيادة العرض.
- ٣- ما هي فوائد اجراء التقييم البيئي؟ وما هي خطوات معالجة الاثار البيئية للمشروع.

السؤال الثالث:- (٢٥ درجة)

- ١- ما المقصود ب المخزون ؟ - ولماذا نحتفظ بالمخزون؟
- ٢- اذكر اسس ومبادئ عملية تقييم المشروعات.
- ٣- تكلم عن اهم أساليب المفاضلة بين المشروعات الاستثمارية.
- ٤- اذكر اهم نقاط الاختلاف بين معايير الربحية التجارية ومعايير الربحية القومية.
- ٥- ما المقصود بطريقة القيمة الحالية المكافئة (EPW)

السؤال الرابع :- (٢٥ درجة)

- اكتب نبذة مختصرة عن:-
- ١- وظائف الادارة الخمسة.
 - ٢- المعلومات الخاصة بالسوق.
 - ٢- أهم البيانات الثانوية اللازمة لاجراء دراسة الجدوى التسويقية
- اكتب نبذة مختصرة عن التقرير الخاص بك.

مع أطيب التمنيات بالنجاح
د/د عبد الفتاح مصطفى خورشيد

Tanta University

Date:

Faculty of Engineering

Time allowed: 3 hrs

Department of Mechanical Engineering

Full Mark: 80 Marks

Year: 4 year Mechanical production

Subject: Final Exam.

Final Exam: 2 Pages

Name: Jigs & fixtures

Academic Number:

Answer as much as you can

(20 Marks)

1- A. It's required to design A fixture For Helping in machining of 20 blocks of 4x5x5 cm to be of the same dimensions as final machining step. Draw a schematic drawing indicating the necessary components.

1- B. It's required to design A fixture For Helping in machining of 20 cylinders of 4 cm diameter to be of the same height of 5 cm as final machining step. Draw a schematic drawing indicating the necessary components.

(20 Marks)

2- Using comparative analysis for the following tooling problem : A total of 950 flange plates require four holes accurately drilled 90 degrees apart to mate with a connector value. Which of the listed alternatives is the most economically desirable?

a. Have a machinist who earns \$10.00 per hour lay out and drill each part at a rate of 2 minutes per part.

b. Use a template jig, capable of producing 50 parts per hour and costing \$18.00, in the production department, where an operator earns \$6.50 per hour.

c. Use a duplex jig, which costs \$37.50 and can produce a part every 26 seconds, in the production department, where an operator earns \$6.50 per hour.

(20 Marks)

3- write down the production process plan for the next part, if it was manufacturing from raw material of 30x50x70 mm of mild steel strap. Indicate if there are a needs of jig or fixture for a certain manufacturing process and describe it briefly.



Course Title: Operations Research
Date: Jan 2013 (Second term)

Course Code:
Allowed time: 3 hrs

Year: 4
No. of Pages: (2)

Remarks: (answer the following questions... assume any missing data... answers should be supported by clear estimations , tables, sketches...etc)

Q1: A factory manufactures a product each unit of which consists of 5 units of part A and 4 units of part B. the two parts A and B require different raw materials of which 120 units and 240 units respectively are available. These parts can be manufactured

by three methods. Raw material requirements per production run and the number of units for each part produced are given in Table 1. Determine the number of production runs for each

Table 1	Input per run (units)		Output per run (units)	
	Raw material	Raw material	Part A	Part B
method	1	2		
1	7	5	6	4
2	4	7	5	8
3	2	9	7	3

method so as to maximize the total number of complete units of the final product.

Q2: Determine the feasible solution of variables with using M technique:

$$\text{Minimize } z=4x_1+x_2$$

$$3x_1+x_2 \geq 3$$

$$4x_1+3x_2 \geq 6$$

$$x_1+2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

Q3: Distinguish and discuss these cases graphically and mathematically.

Maximize $Z=3X_1+9X_2$	Maximize $Z=3X_1+2X_2$	Maximize $Z=2X_1+4X_2$	Maximize $Z=2X_1+X_2$	Maximize $Z=3X_1+2X_2$
$X_1+4X_2 \leq 8$	$4X_1+3X_2 \leq 12$	$X_1+2X_2 \leq 5$	$X_1-X_2 \leq 10$	$2X_1+X_2 \leq 2$
$X_1+2X_2 \leq 4$	$4X_1+X_2 \leq 8$	$X_1+X_2 \leq 4$	$2X_1 \leq 40$	$3X_1+4X_2 \geq 12$
$X_1, X_2 \geq 0$	$4X_1-X_2 \leq 8$	$X_1, X_2 \geq 0$	$X_1, X_2 \geq 0$	$X_1, X_2 \geq 0$
	$X_1, x_2 \geq 0$			

Q4: A company has factories at four different places, which supply warehouses A,B,C,D AND E. Monthly factory capacities are 220, 180, 150 and 280 units respectively. Monthly warehouse requirements are 110, 190, 120, 230 and 160 units respectively. Unit's profits are given in L.E. Determine the optimum transportation to maximize profits.

To From	A	B	C	D	E
1	13	14	11	8	12
2	14	9	17	6	10
3	13	11	12	17	15
4	10	10	13	18	11

Q5: Five wagons are available t stations 1,2,3,4 and 5. These are required at five stations I, II, III, IV and V. the mileages between various stations are given by the table indicated. How should the wagons be transported (assign) so as to minimize the total mileage covered?

	I	II	III	IV	V
1	10	5	9	18	11
2	3	9	6	12	4
3	3	2	4	4	5
4	1	9	12	17	5
5	11	6	14	19	10

مع تمنياتى بالتوفيق د.م/ احمد القصاص



Course Title: Statistics and Quality Control
Date: 29-05- 2013

Course Code: MPD 4234
Allowed time: 3 Hrs

Year: 4th Production
No. of Pages: (2)

Answer All The Following Questions:-

[Each Question Carries 14 Marks]

Question (1):- (14 Marks)

(a) What are the meaning of:

(1)Statistics. (2)Continuous data. (3)Population. (4)Sample. (5)Parameter. (6)Histograms.
(7)Class mark. (8)Frequency distributions. (9) Mean. (10) Variance.

(b) What are the basis and aims of inspection?.

(c) Show and draw the quality cycle? What are the detailed reasons to change quality degree?.

Question (2):- (14 Marks)

Arrange the following set of 40 coded measurements on a manufactured part into a frequency distribution, and construct:-

(a) A histogram.

(b) A frequency polygon.

and (c) Ascending Ogives.

26	27	39	14	22	17	39	31
38	12	18	27	15	10	14	23
15	37	16	31	34	36	22	18
21	36	22	38	21	25	17	15
14	15	11	27	28	19	12	27

Question (3):- (14 Marks)

Use the frequency distribution of masses in the following table:-

(i) The mean deviation,

(ii) The standard deviation.

Table[Q(3)]

Mass (kgs)	Frequency
60 - 62	5
63 - 65	18
66 - 68	42
69 - 71	27
72 - 74	8

Total: 100

Question (4):- (14 Marks)

(i) Define the poisson distribution and show that the sum of probabilities in it equals 1.

(ii) At a certain company, the average number of telephone calls arriving in one hour is 12. Calculate the probability that the number of calls is

(a) Less than 2.

(b) More than 3.

(iii) Define the Expectation and the Variance of a discrete random variable.

(iv) Prove that if X and Y are independent, then

$$V(X+Y) = \text{Var}(X) + \text{Var}(Y).$$

(v) Define the normal distribution.

Question (5):- (14 Marks)

Compute the variance and standard deviation of the frequency distribution provided in the following Table.

Table[Q(5)]

Diameters in cms	Frequency(no. of parts)
2.05 – 2.14	35
2.15 – 2.24	64
2.25 – 2.34	90
2.35 – 2.44	190
2.45 – 2.54	220
2.55 – 2.64	163
2.65 – 2.74	87
2.75 – 2.84	81
2.85 – 2.94	70

Total: 1000

... (((With My Best Wishes))) ...

Answer al the following questions:-

QUESTION 1:- (45%)

In the three-axis SCARA robot shown in Fig. 1, the first two joint variables are revolute variables while the third joint variable is a prismatic one. For this manipulator carry out the following steps:

a- Solve the direct kinematic model at the manipulator state

$$q = [\pi/4 \quad \pi/2 \quad d_1/2]^T; \text{ given that } a_1=a_2=0.5\text{m and } d_1=1\text{m.}$$

b- Derive the 6×3 Jacobian matrix and then evaluate the differential change, $d {}^0T_3$, for the differential change in the joint coordinates $dq = [0.1 \quad 0.1 \quad 5\text{mm}]^T$ at the above manipulator state.

c- Find the new location of the end-link frame after the above differential motion.

QUESTION 2:- (20%)

Solve the inverse kinematic problem of the robot manipulator shown in Fig. 2.

QUESTION 3:- (20%)

Derive the independent rolling and sliding constraints of the wheels of the differential drive mobile robot (with un-powered Castor wheel) shown in Fig. 3.

QUESTION 4:- (15%)

In a robotic system, a camera (*cam*) is attached to the fifth link (5) of a robot with 6 D.O.F. The camera observes an object (*obj*) and determines its frame relative to the camera's frame. By using the following transformations, draw the *transform graph* of the system and then determine the necessary motion the end effector (*E*), which is given relative to the hand frame (*H*), has to make to grasp to the object.

$${}^H T_E = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad {}^{cam} T_{obj} = \begin{bmatrix} 0 & 0 & 1 & 2 \\ 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad {}^5 T_H = \begin{bmatrix} 0 & -1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix} \quad {}^5 T_{cam} = \begin{bmatrix} 0 & 0 & -1 & 3 \\ 0 & -1 & 0 & 0 \\ -1 & 0 & 0 & 5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

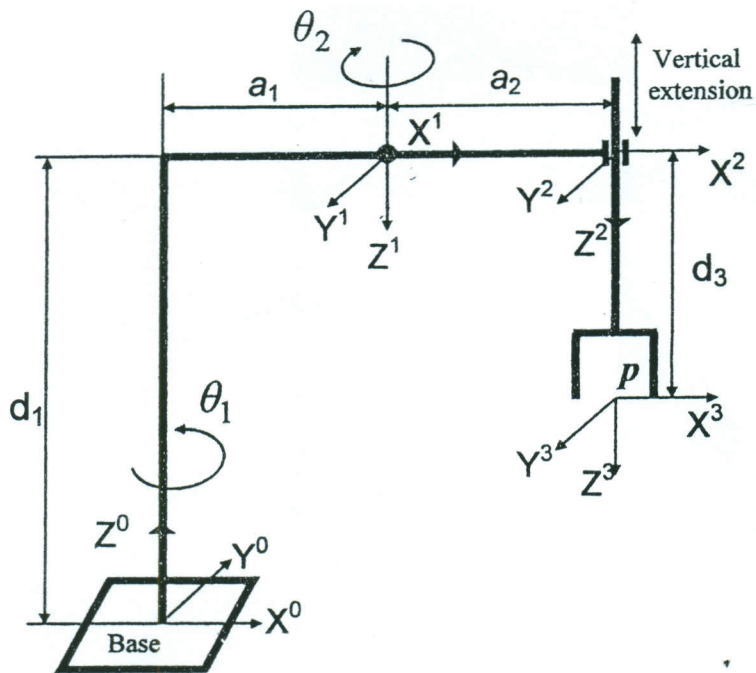


Fig. 1

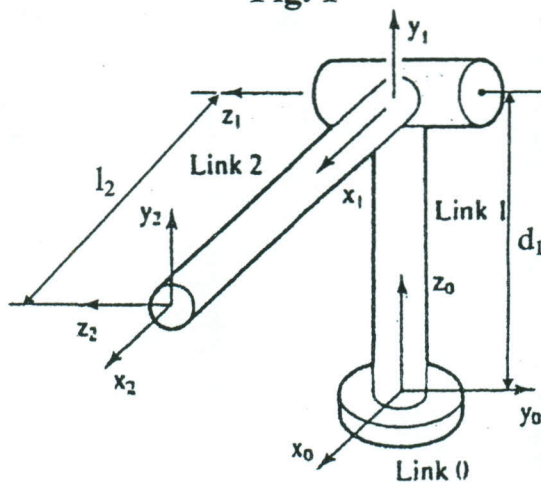


Fig. 2

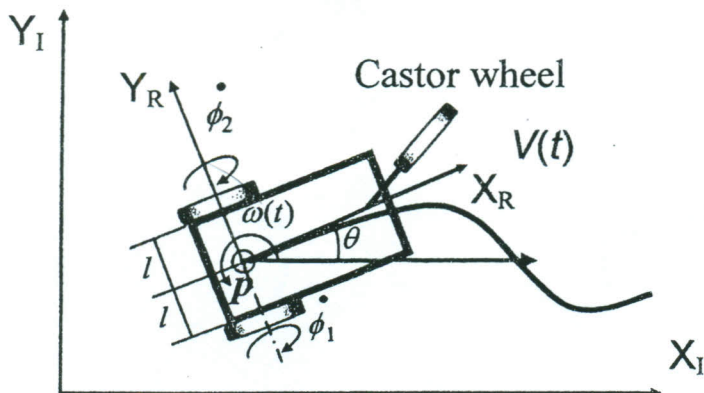


Fig. 3