

Engineering Economics HS-202
Special Scientific Programs

FINAL EXAMINATION
LOAD: 50% OF TOTAL COURSE MARK

EXAMINATION DURATION: 2 HOURS
13TH AUGUST 2012

$$\begin{aligned} (F/P, i, n) &= (1+i)^n & (F/A, i, n) &= \frac{(1+i)^n - 1}{i} & (P/A, i, n) &= \frac{(1+i)^n - 1}{i(1+i)^n} \\ (P/F, i, n) &= \frac{1}{(F/P, i, n)} & (A/F, i, n) &= \frac{1}{(F/A, i, n)} & (A/P, i, n) &= \frac{1}{(P/A, i, n)} \end{aligned}$$

- [10 points] 1. Suppose that one has a beginning indebtedness of \$10,000 , which is to be repaid in equal end of month installments for 5 years with a nominal interest of 12% compounded monthly. What is the amount of each payment?
- [5 points] 2. A credit card company charges an interest rate of 2% per month on the unpaid balance of all accounts. The annual interest rate, they claim, is 24% .What is the effective rate of interest per year being charged by the company.
- [10 points] 3. An environmental engineer must recommend one of two methods for monitoring bacteria count in municipal water. Use the present worth analysis coupled with the LCM to select the most economic method to implement if the MARR is 12%.

	Method A	Method B
First Cost \$	-100,000	-250,000
Annual operating cost \$/year	-40,000	-20,000
Salvage Values \$	0	0
Life, years	3	6

- [10 points] 4. A lathe purchased by a machine tool company 10 years ago for \$75,000 can be used for 3 more years. Estimates are an annual operating cost of \$63,000 and a salvage value of \$25,000. A challenger will cost \$130,000 with an economic life of 6 years and an annual operating cost of \$32,000 and salvage value of \$45,000. On the basis of these estimates, what market value of the old lathe will render the challenger equally attractive (required here the replacement value). Use an interest rate of 12% per year.
- [10 points] 5. For the last fifteen years, a quality manager has paid \$1,000 annually for the software maintenance contract of a LAN. What is the equivalent amount after the last payment, if the funds are taken from a pool that has been returning 10% per year compounded weekly? Draw the cash flow diagram.[Hint a year has 52 weeks]
- [5 points] 6. You purchased a new mobile phone for 3000 LE it is estimated that you would like to replace your mobile phone at the end of the 3rd year. If it is estimated that the phone you bought will have a salvage value of 375 LE at the end of the third year. What is the annual depreciation and the book value of your phone at the end of the first and second years using the declining balance method with a depreciation rate of 50%.

Good Luck



August 2012

أغسطس 2012

Course title and number: Accounting HS
320d

اسم المقرر والرقم الكودي: المحاسبة

Time allowed: 2 Hours

الزمن: 2 ساعة

Attempt all problems:

- 1- During the month of July and August 2011, the following data was obtained for steel dies making plant:

Sales	\$1650000	Provision for income tax	\$80000
Rents	50000	Utilities	30000
Dividends from others	28000	Bank interest received	2000
Research	50000	Cost of goods sold	850000
Provisions for employee bonus	100000	Salaries	80000
Marketing and administration	250000		

Prepare the income statement for month of July and August 2011 and determine the net profit of the two months (current income tax is 20%)

- 2- The purchasing cost of threading machine was \$86000, and the installation cost cost was 50 percent of the purchasing cost, the useful life time of the machine is 10 years from the start of the production with scrap value 10% of the total cost. Use the total sum of years digits method for determination:

- Book value of the machine after 5 years from the start of production
- The percent of the original investment paid after 5 years of production

- 3- What are asset or liabilities in the following accounts:

Construction	Working capital
Fixed capital	Research
Capital stock	Inventories
Cost of goods sold	Dividends from other companies
Retained earnings	Bank over draft
Sales	

- 4- Prepare balance sheet applicable at the date when Y corporation had the following assets and liabilities:

Cash	\$3000	Account payable	\$1200
Account receivable	4000	Inventories	5000
Common stock sold	20000	Equipments	18000
Furniture	2000		

- 5- Manufacturing project produce 400 ton of product annually. The selling price of the product is \$0.162/kg. Raw materials cost for the product are \$0.5/kg, labor \$0.48, utilities \$0.05/kg, administration \$0.05, and packaging \$0.08/kg. Depreciation charge is \$0.07. Estimate the following:

- Manufacturing cost per kg of product
- Annual total manufacturing cost
- Annual profit and net profit (current income tax is 0.2)

Exam Committee: Lecturer Name , , ,

المادة: Engineering Ethics
التاريخ : 11 أغسطس 2012
زمن الإمتحان : ساعتان

جامعة الإسكندرية
كلية الهندسة
البرامج العلمية المتخصصة

إسم الطالب : _____

رقم الطالب : _____

	Question	Mark
1	First Question	
2	Second Question	
3	Third Question	
	Total	

Answer the following questions:

Question One:

Select the most suitable choice to complete each of the following sentences:

- 1- When application of moral values is problematic this will generally result in an:
a- Ethical virtue b- Ethical value c- Ethical dilemma d- Ethical vice
- 2- Ethical issues which concern the general direction of technological development and collective responsibilities of engineers and engineering professional societies are known as:
a- Micro issues b- Macro issues c- Biased issues d- True issues
- 3- Those who view advanced technology as ominous (evil) and often out of our control are called:
a- Pessimists b- Optimists c- Utilitarians d- Economists
- 4- When two or more solutions, no one of which is mandatory but one of which should be chosen is an example of dilemmas having solutions that are:
a- Well-reasoned b- Better-Worse c- Cost-Benefit d- Right-Wrong
- 5- In the case of artificial lung design team, meeting patients and their families helped to support the following moral value:
a- Personal commitment b- Moral awareness c- Moral accountability d- Justice
- 6- When LeMessurier took the initiative and started the Citicorp Tower rescue plan, he was considered as being morally:
a- Responsible b- Accountable c- Blameworthy d- Competent
- 7- Micro ethical issues in engineering concern the decisions made by:
a- Individuals and companies b- Individuals only c- Companies only d- Professional societies
- 8- In the Hyatt Regency Hotel Case, the executed design modification can be considered as:
a- Design improvement b- Cost saving c- Recklessness d- Professional
- 9- The ethics theory which says that right actions are those which respect the liberty or autonomy of individuals is
a- Virtue Ethics b- Utilitarianism c- Rights Ethics d- Duty Ethics
- 10- The ethics theory which implies that; right actions are those required by rules that produce the most good for the most people is
a- Act-Utilitarianism b- Rule- Utilitarianism c- Rights Ethics d- Duty Ethics
- 11- The ethics theory which says that good character is central to morality is:
a- Virtue Ethics b- Utilitarianism c- Rights Ethics d- Duty Ethics
- 12- The "Special moral issues" are those created by:
a- A contract b- The law c- Common sense d- Personal commitment
- 13- Desirable habits or tendencies in action are called:
a- Characters b- Vices c- Virtues d- Rights

- 14- The tendency *not to harm others* intentionally -which is the minimum virtue in engineering- is known as:
a- Non-maleficence b- Beneficence c- Competence d- Recklessness
- 15- Alertness to dangers and careful attention to detail in performing engineering tasks is known as:
a- Creativity b- Generosity c- Justice d- Diligence
- 16- A person performing with requisite skill, experience, exercising due care and persistence:
a- Ignorant b- Prudent c- Competent d- Confident
- 17- Acting to fulfill one's contractual duties to an employer:
a- Agency-loyalty b- Attitude-loyalty c- Justice d- Executive authority
- 18- A virtue of team work that includes respect for colleagues, connectedness and commitment to the moral ideals inherent in one's profession:
a- Loyalty b- Confidentiality c- Justice d- Collegiality
- 19- Keeping secret the information specified by an employer or client in order to compete effectively against business rivals, especially proprietary information and trade secrets:
a- Collegiality b- Loyalty c- Agency-loyalty d- Confidentiality
- 20- The corporate or institutional right given to a person to exercise power based on the resources of an organization:
a- Expert authority b- Executive authority c- Power d- Management
- 21- When an employee conveys information about a significant moral problem to someone -outside the organization- in a position to take action on the problem:
a- Collegiality b- Internal whistle blowing c- Expert authority d- External whistle blowing
- 22- The rights of professionals needed to meet their responsibilities include the right of professional conscience, the right of conscientious refusal and the right of:
a- Recognition b- Management c- Authority d- Loyalty
- 23- Situations where professionals or other employees have an interest that if pursued, might keep them from meeting their obligations to their employers or clients are called:
a- Open whistle blowing b- Professionals' rights c- Conflicts of interest d- Authority
- 24- The "potential for the realization of unwanted consequences from impending events"
a- Vise b- Fault c- Activity d- Risk
- 25- Rights to benefits needed for a decent human life, when one cannot earn those benefits and when the community has them available:
a- Welfare rights b- Negative rights c- Liberty rights d- Legal rights

Question Two:

A- Complete the following sentences using the most suitable words:

- i- According to Kant moral duties require us to do what is right because it is right, unconditionally and without special incentives attached, as such they are described as
- ii- In an “ethical corporate climate” the basic principles for conflict resolution include; focusing on interests, not positions, insist that the result (of conflict resolution) be based on some objective standard, and
- iii- The magnetic door catch introduced on refrigerators, and are examples of improved safety
- iv- In regard to technology, risk can include dangers of bodily harm, and
- v- A thing is safe if
- vi- Examples of safe exits include; realistic ways to evacuate communities nearby a nuclear power plant, and
- vii- Teamwork virtues include cooperativeness, and
- viii- Proficiency virtues include competence, and
- ix- The pattern of virtues and vices in an individual is called

B- The cost-benefit analysis for the “Pinto automobile by Ford Corporation” case departs from the Utilitarianism theory analysis in the following points:

i-

ii-

iii-

Third Question:

A- Compare between each of the following:

1-	a- Negative rights:	b- Positive rights:
2-	a- Competence in engineering:	b- Diligence in engineering:
3-	a- Proficiency motives:	b- Compensation motives:

B- Any improvement in safety as it relates to an engineered product is often accompanied by an increase in the cost of that product. What are the cost elements to be considered in this respect? Use appropriate graphs to illustrate your answer.

Use appropriate graphs to illustrate that a product may be said to be safe if its capability exceeds its duty.

August 2012

أغسطس 2012

Course title number: Specification and
Feasibility Studies H-S 501a
Time allowed: Two Hour

اسم المقرر والرقم الكودي: دراسات الجدوي

الزمن: 2 ساعة

Solve all problems:

- 1- The annual local supply and annual import for Y product during the years from 2007 to 2011 are shown in the following table:

Year	2007	2008	2009	2010	2011
Local supply, Ton	600000	600000	600000	600000	600000
Import	800000	850000	940000	1100000	1500000

Estimate:

- The annual demand for the years 2007 to 2018
- 2- The 2007 cost for an installed aluminum tank weighing 100000kg was \$390000. For a size ranging from 100000kg to 1000000kg the total cost weight exponent for aluminum tank is 0.93. If aluminum tank weighing 700000kg is required, what is the present cost (2011) needed?
(2007 Marshall Cost index is 1080 and is 1462 for 2011)
- 3- The total capital investment for chemical plant is \$800000, and the working capital investment is 15% of the total capital investment. The plant capacity is 5 ton per day during 330 ton per year. What selling price per kg is necessary to give turn over ratio 1.4
- 4- A piece of equipment was purchased for \$30000 and was to be used for 5 years with an expected salvage value of \$5000. What are the annual depreciation charge and book values of the asset for the fourth years by using:
- The straight line depreciation method
 - The total sum of the years digits method
- 5- On third August a manufacturing plant had 1200 ton of raw material on hand which was purchased at a cost of \$60 per ton. In order to build up the reserve, 1000 ton additional raw material was purchased on August 20 at a cost of \$69 per ton and 5 days later 9000 ton was purchased from another supplier at \$75 per ton. If none of the raw material was used until the last purchase, determine the total cost of 1200 ton of raw material on an inventory for the month of August by using different methods.

Exam Committee: Lecturer Name , , ,

Aug, 2012

اغسطس 2012

Course title Number: Math (1) MP 101

اسم المقرر: رياضيات MP 101-1

Time allowed: 2 hrs

الزمن : ساعتان

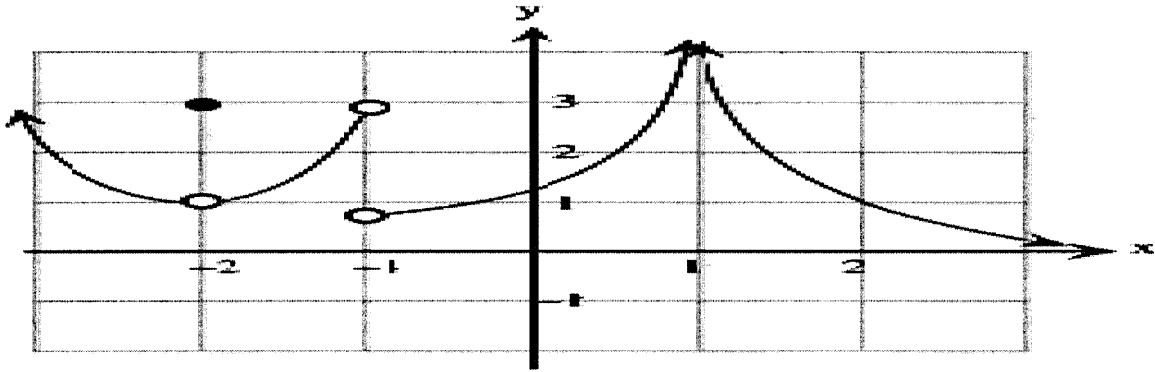
برجاء بداية اجابة كل سؤال في صفحة جديدة

Answer the Following Question اجب على السؤال التالى

Q1.

(20 marks)

a) Use the given graph of the function $y = f(x)$ to determine if the following statements are correct or false. Explain your answer. (6 marks)



- $f(x)$ is not continuous at $x = -2$
- $f(x)$ is not continuous at $x = -1$
- $f(x)$ is continuous at $x = 0$
- $f(x)$ is continuous at $x = 1$
- $\lim_{x \rightarrow -1^+} f(x) = f(-1)$
- $f(-2)$ is not defined

b) Find $\frac{dy}{dx}$ for the following:

(10 marks)

i) $y = \sin^3 \tan(e^{\sqrt{x}})$

ii) $y = \frac{\cot x}{3^x} + e^{(x^2 \sec 2x)}$

iii) $y = \ln 3 \sqrt{\frac{e^{-3x^2} \sin^{-1} x^2}{(3-2x^3)^4}}$

c) Determine whether $f(x) = x^3 - 4x + 1$ is one-to-one function, if it is find $f^{-1}(-2)$ and $f^{-1}(1)$

(4 marks)

please turn over

Answer Two Questions Only اجب على سوالين فقط مما يلي

Q2. (16 marks)

a) Find $\frac{dy}{dx}$ for the following functions: (10 marks)

i) $y = x^{e^x}$ ii) $x^2 y^3 - \frac{y}{x} = \sin(x + y)$ iii) $y = \ln(x + \cos x) + \ln \ln x$

b) Find the equation of the straight line that passes through the point (1, 2) and perpendicular to $2y - 4x + 1 = 0$. Does the line pass through the origin? (6 marks)

Q3. (16 marks)

a) Let $f(x)$ be a rational function defined by $f(x) = \frac{3x + 6}{x - 2}$. then (8 marks)

i- Find the domain of $f(x)$

ii - Find the x and y intercepts of the graph of $f(x)$

iii - Find the vertical, horizontal and slant asymptotes for the graph of $f(x)$, if there are any.

iv- Use your answers to parts i, ii and iii above to sketch the graph of $f(x)$

b) Use Newton's method to find an approximate root of $x^4 - 3x^2 + 1 = 0$ near $x_0 = 1$
Execute two iterations only and approximate for four decimal places. (8 marks)

Q4. (16 marks)

a) Given that $y = 2x - x^2$ then, (8 marks)

i) Solve the inequality $y \geq 0$

ii) Starting from $y = x^2$, sketch the graph of the parabola $y = 2x - x^2$, illustrate all the transformations you might use.

iii) Find the dimensions of the rectangle of **largest area** with base and two vertices on the x-axis and the other two vertices on the parabola $y \geq 0$.

b) Evaluate the following limits: (8 marks)

i) $\lim_{x \rightarrow \infty} \left(\frac{1}{x} \right)^{e^{-x}}$

ii) $\lim_{x \rightarrow 0} \frac{xe^x - \sin x}{1 - \cos x}$



Alexandria University - Faculty of Engineering
Alexandria, 21544, EGYPT



Specialized Scientific Program

MP107 Engineering Physics I

All Departments

Final-of-Summer Semester Exam

Date: July, 2012

Instructor(s): Dr. Amr M. Mahros – Eng Iman El-Zahaby

Time: 2 hours

Solve the following question

Name: _____

ID: _____

Program: _____

Q1: (15 marks)

- a. Derive an expression for the moment of inertia of a uniform rigid rod of length (L) and mass (M) about an axis perpendicular to the rod and passing through its center of mass. Then, use the parallel-axis theorem to find the moment of inertia about an axis perpendicular to the rod through one end.

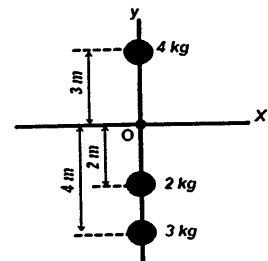
[4 marks]

- b. Find an expression for the moment of inertia of the rotating particle.

[3 marks]

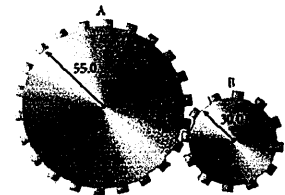
- c. Rigid rods of negligible mass lying along the y axis connect three particles as shown in the figure. If the system rotates from rest about the x axis with an angular acceleration of 2 rad/s^2 , calculate

- i. The moment of inertia about the x axis.
- ii. The operating torque.
- iii. The angular speed of the system after 5 s.
- iv. The rotational kinetic energy of the system.



[4 marks]

- d. Gear A, with a mass of 1 kg and a radius of 55 cm, is in contact with gear B, with a mass of 0.5 kg and a radius of 30 cm. The gears do not slip with respect to each other as they rotate. Gear A rotates at 120 rpm and slows to 60 rpm in 3 s. How many rotations does gear B undergo during this time interval?



[4 marks]

Q2: (15 marks)

- a. Clearly distinguish among heat, internal energy, and temperature.

[3 marks]

- b. Derive an expression for the work done by a gas that undergoes

- i. An isothermal process.
- ii. An isobaric process.

[4 marks]



- c. One mole of an ideal gas is heated so that $T = AP^2$, where A is constant. The temperature changes from T_0 to $2T_0$. **Prove that**, the work done by the gas is given by $W = \frac{1}{2} R T_0$.
[3 marks]

- d. Two moles of an ideal gas have an initial pressure $P_1 = 2$ atm and an initial volume $V_1 = 2$ L. The gas is taken through the following cycle: It is expanded isothermally until it has a volume is $V_2 = 4$ L. - It is then heated at constant volume until it has a pressure $P_3 = 2$ atm - It is then cooled at constant pressure until it is back to its initial state.

$$(R = 8.31 \text{ J/ mole K}, C_V = 3/2 R)$$

- Sketch** this cycle on the P-V diagram.
- Calculate** the work done by the gas during each part of the cycle.
- Calculate** the heat added through each part of the cycle.

[5 marks]

Q3: (15 marks)

- a. **How much** energy is required to change a 40 cm^3 of water at 30°C to ice at -10°C ? Given that the specific heat of water is $4000 \text{ J/ kg } ^\circ\text{C}$, specific heat of ice is $2000 \text{ J/ kg } ^\circ\text{C}$, and the latent heat of fusion is $3 \times 10^5 \text{ J/ kg}$.

[4 marks]

- b. A copper ring to fit tightly about a steel rod whose diameter is 6 cm at 20°C . The inside diameter of the copper ring at that temperature is 5.98 cm. To what temperature must the copper ring be raised so that it will just slip on the steel rod?

$$(\alpha_{\text{Cu}} = 19 \times 10^{-6} \text{ } ^\circ\text{C}^{-1} \text{ \& } \alpha_{\text{Steel}} = 24 \times 10^{-6} \text{ } ^\circ\text{C}^{-1}),$$

- In the case that only the ring is heated.
- In the case that both ring and rod are heated together.

[4marks]

- c. Two masses, M_1 and M_2 , are supported by wires of equal length when unstretched. The wire supporting M_1 is an aluminum wire 0.7 mm in diameter, and the one supporting M_2 is a steel wire 0.5 mm in diameter. What is the ratio M_1/M_2 if the two wires stretch by the same amount? Given that Young's modulus for the steel is $2 \times 10^{11} \text{ N/m}^2$ and that for the copper is aluminum $1 \times 10^{11} \text{ N/m}^2$.

[4 marks]

- d. Describe at least two of the three main types of deformations. Use proper sketches and equations. Sketch stress-versus-strain curve.

[3 marks]



Alexandria University
Faculty of Engineering
Engineering Mathematics and Physics
SPECIALIZED SCIENTIFIC PROGRAMS (SSP)
Course Title: Engineering Graphics
Course Code: MP 105
Time: Three Hours
Date: 14/8/2012
Final Exam
No. of Pages: 9
Instructor: Dr \ Sameh Zenhom Ibrahim

Name :

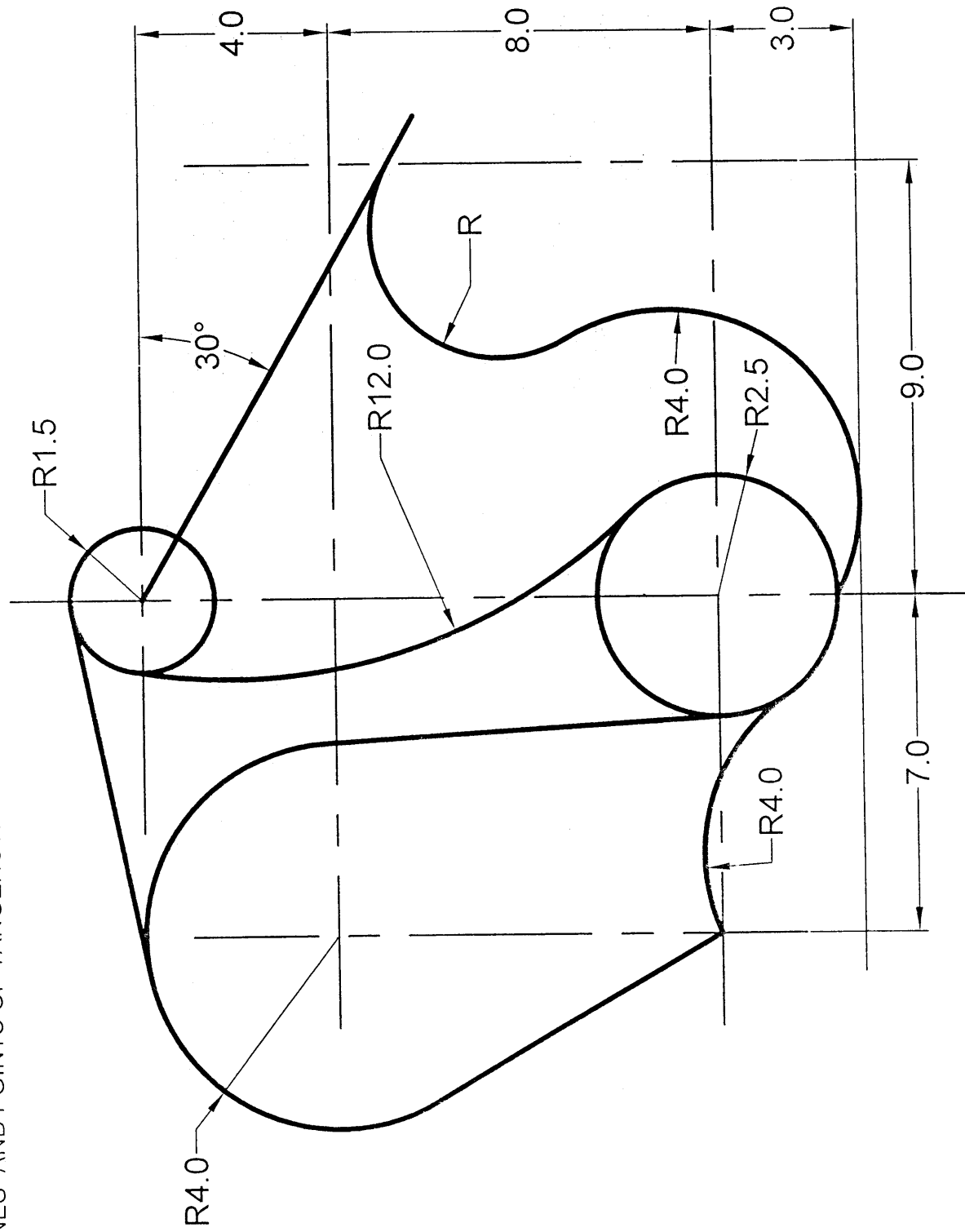
ID :

QUESTION NO. 1 (15 POINTS)

DRAW THE FOLLOWING FIGURE INCLUDING THE REQUIRED CONSTRUCTION LINES AND POINTS OF TANGENCY.

DIMS. IN CMS.

SCALE 1:1



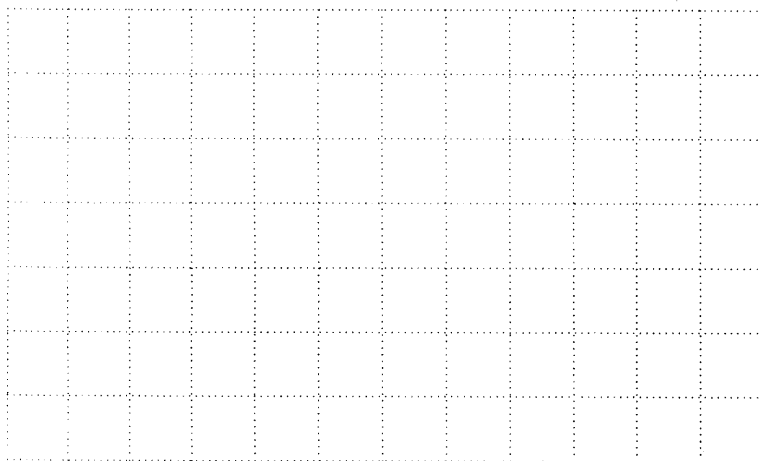
QUESTION NO. 2 (15 POINTS)

FOR THE GIVEN 3-D OBJECT, DRAW THE FOLLOWING:

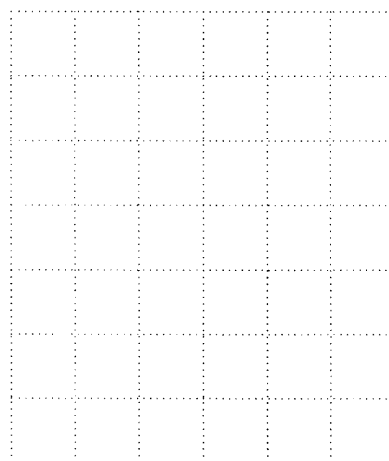
a- ELEVATION

b- SIDE VIEW

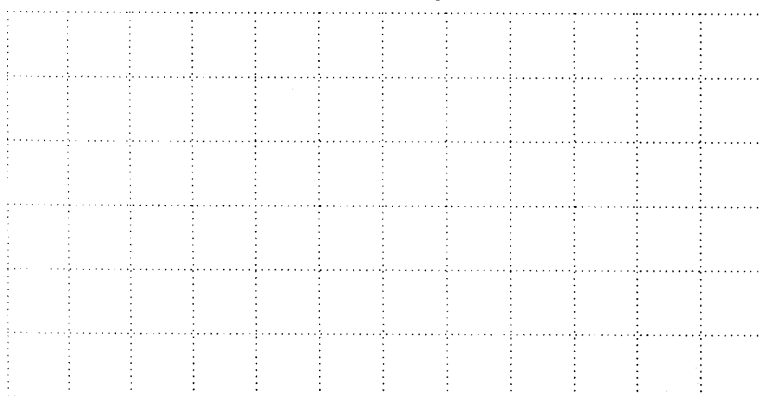
c- PLAN



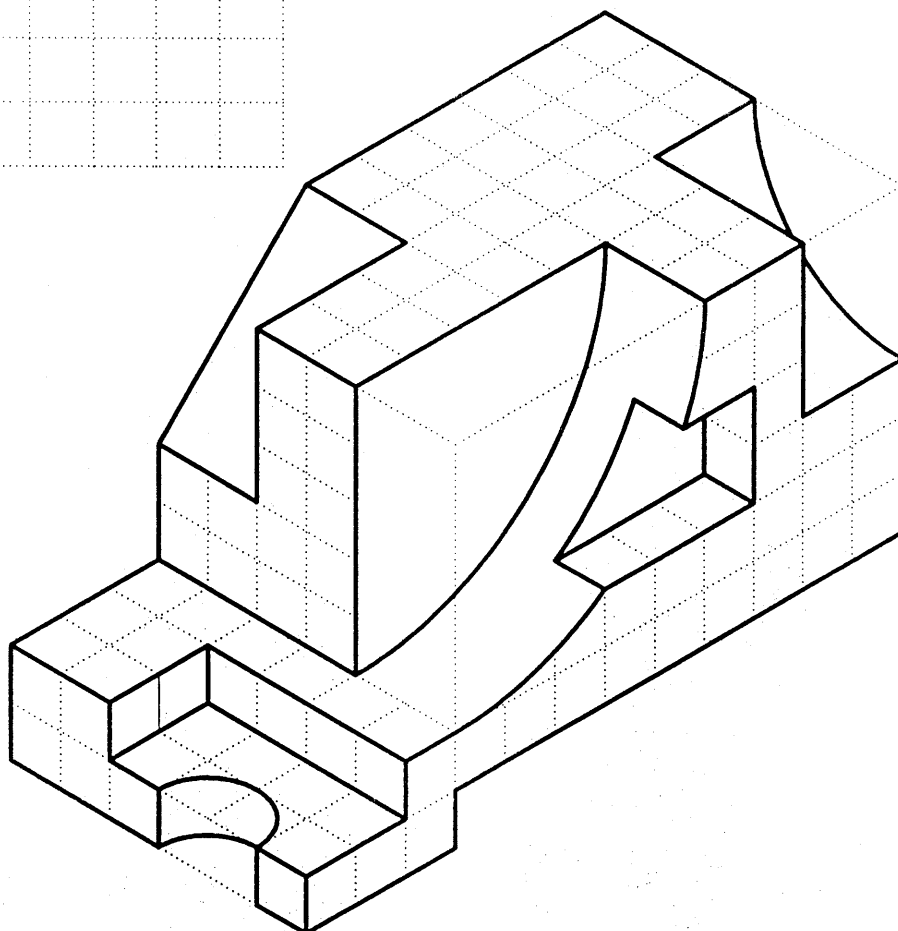
ELEVATION



SIDE VIEW



PLAN

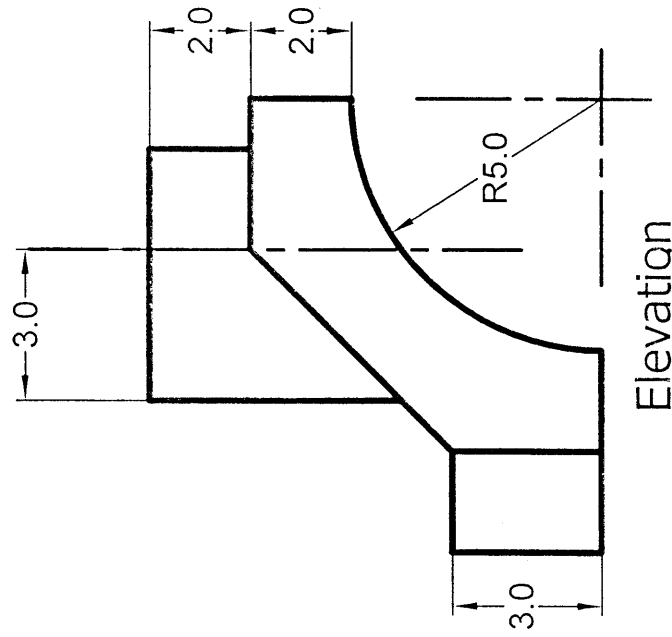


QUESTION NO. 3 (15 POINTS)

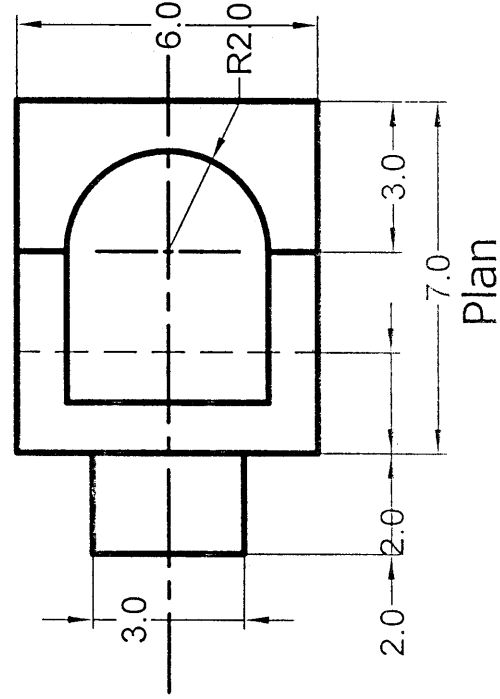
FOR THE GIVEN TWO VIEWS, DRAW THE ISOMETRIC VIEW.

DIMS. IN CMS.

SCALE 1:1



Elevation



Plan

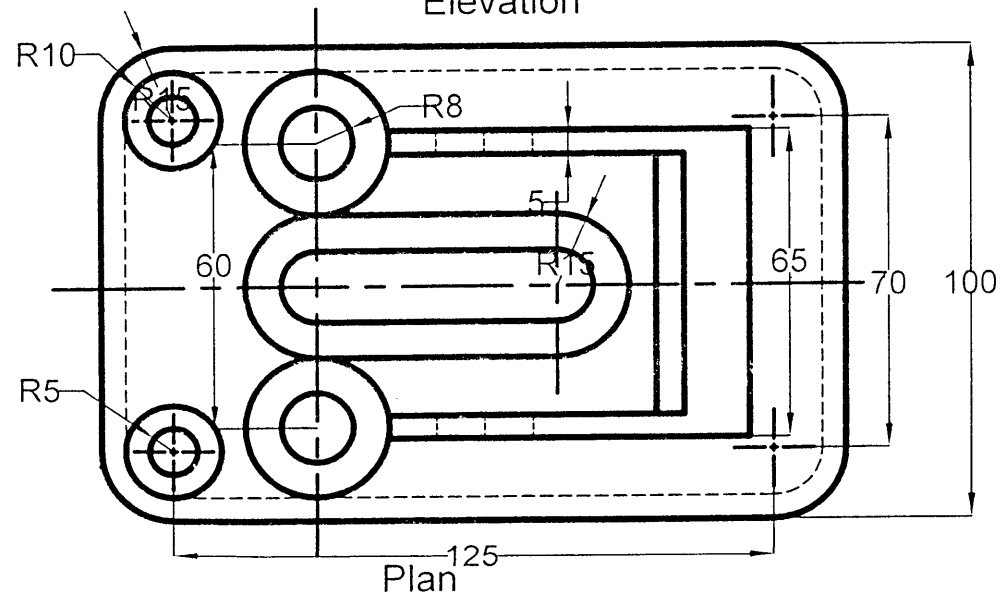
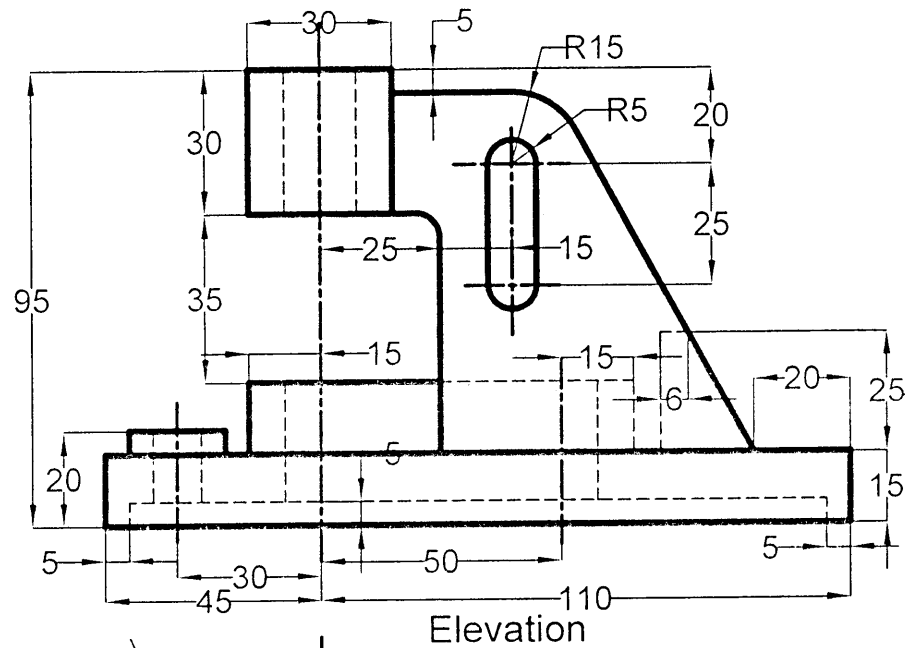
QUESTION NO. 3 (15 POINTS)

QUESTION NO. 4 (20 POINTS)

FOR THE GIVEN TWO VIEWS DRAW:

a- SEC. SIDE VIEW (12 POINTS)

b- SEC. ELEVATION (8 POINTS)



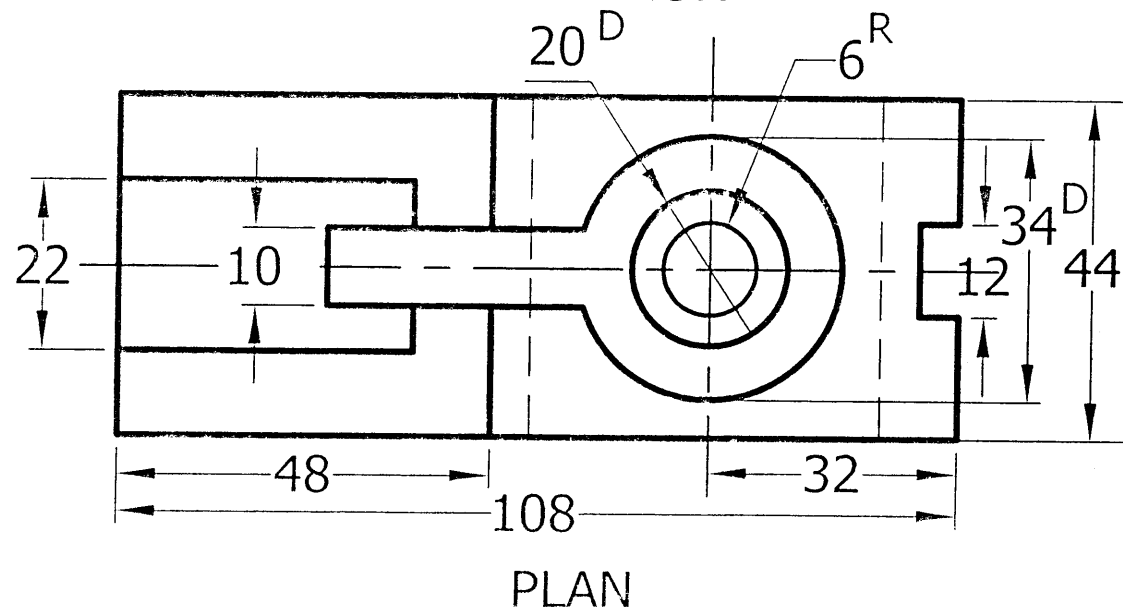
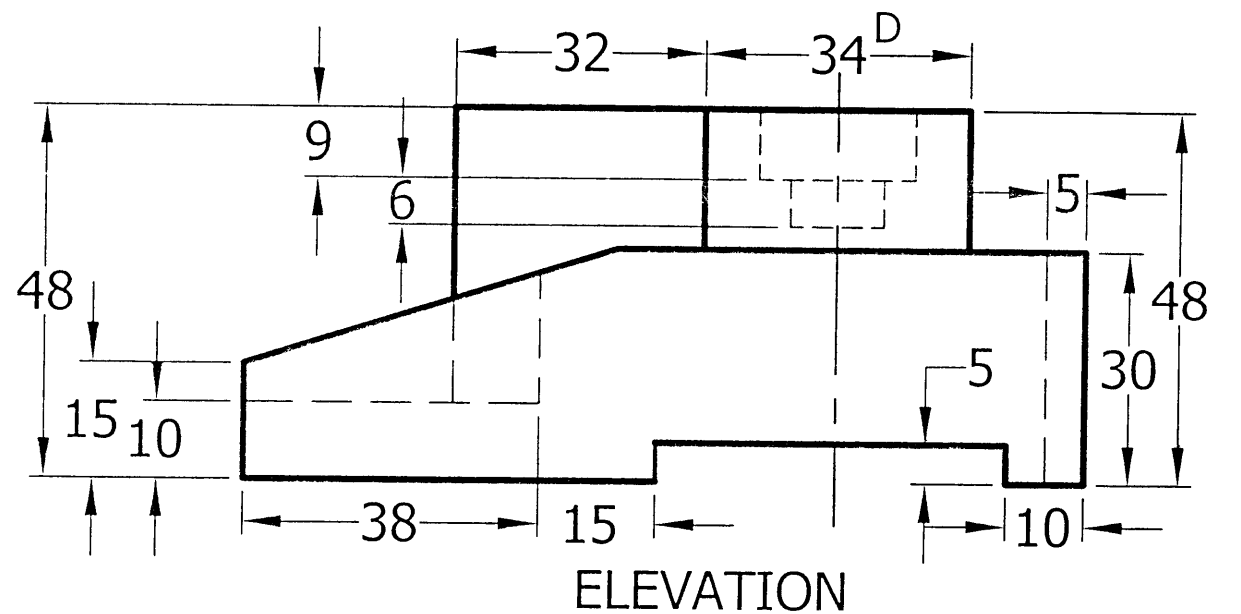
Side View

QUESTION NO. 4 (20 POINTS)

Draw the section Elevation here (8 POINTS)

QUESTION NO. 5 (15 POINTS)

FOR THE GIVEN TWO VIEWS DRAW: SIDE VIEW





August. 2012

أغسطس ٢٠١٢

Mathematics (2) MP 102

رياضيات 2

Time allowed: 2 hours

الزمن : ساعتان

Answer all questions

Question (1)

- (a) The definite integral is defined as the limit of a Riemann sum. Use this definition to evaluate the integral $\int_{-2}^1 (x+3)^2 dx$.. (4 marks)
- (b) Let $f(x) = \int_{x^2+3}^{x+7} \frac{1}{\sqrt{1-t^2}} dt$. Evaluate $\frac{df(x)}{dx}$ by two different methods. (5 marks)
- (c) Evaluate the following integrals: (16 marks)
- i) $\int \frac{2x^2+1}{x^3+x} dx$ ii) $\int \frac{\ln(x+1)}{(x+1)} dx$
- iii) $\int x \tan^{-1} x dx$ iv) $\int \frac{x^2}{\sqrt{2x-x^2}} dx$

Question (2)

- (a) Evaluate the following $\int_0^{\infty} \frac{1}{(x-2)^2} dx$ (5 marks)
- (b) Find the arc length of the curves $y = 4x^{\frac{3}{2}} + 1$, $1 \leq x \leq 2$. (5 marks)
- (c) Evaluate the area between $y = x$ and $y = x^2$, $[0, 3]$. (5 marks)
- Let R be the region bounded by $y = x^2$, $y = 0$ and $x = 1$. Compute the volume
- (d) of the solid formed by revolving R about
- i) x -axis ii) $x = -2$. (10 marks)

Best wishes

August, 2012

أغسطس 2012

Course title Number: Mechanics (2)- MP(104)

اسم المقرر والرقم الكودي له : ميكانيكا (2)

Time allowed: 2 Hours

MARKS: 40

الزمن : ساعتان

الدرجة العظمى : 40

All questions must be answered with drawings.

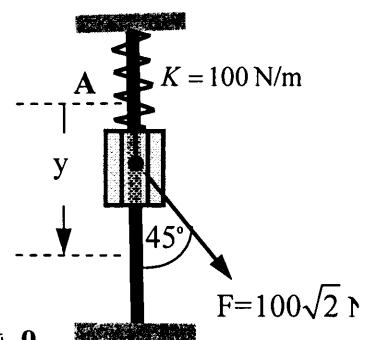
$g = 10 \text{ m/s}^2$

Q1: A particle moves on a curve with acceleration components $\ddot{x} = 2 \text{ m/s}^2$, $\ddot{y} = 0$. If the particle starts from the position $(x_0, y_0) = (4, 2)$ and initial velocity components $(\dot{x}_0, \dot{y}_0) = (4, 1) \text{ m/s}$ determine:

- a- The parametric equations of motion
- b- The Cartesian equation of the path
- c- Magnitude and direction of the velocity and radius of curvature at $x = 9 \text{ m}$

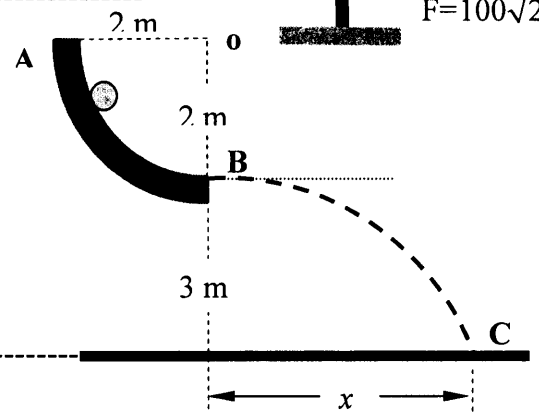
Q2: A collar of mass 2 kg attached to a spring of stiffness $K = 100 \text{ N/m}$ slides vertically on a rough shaft with coefficient of friction $\mu_k = 0.5$. If the collar starts with initial velocity $v_A = 2 \text{ m/s}$ when the spring was unstretched. Determine, when the collar moves a distance $y = 0.2 \text{ m}$:

- a- The normal reaction from the shaft
- b- The velocity and acceleration of the collar



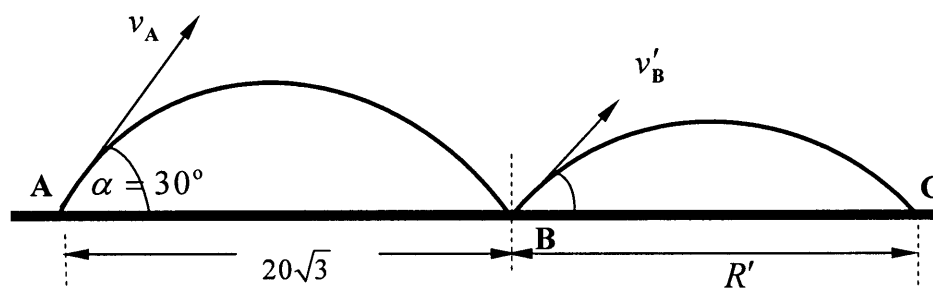
Q3: A particle starts to move from rest at point A on a smooth circular surface with radius 2 m and leaves the surface horizontally at B. Determine

- a) The velocity of the particle at B
- b) The normal reaction from the surface at B
- c) The distance x and time of flight from B to C
- d) The magnitude and direction of the velocity at C



Q4: A projectile is fired from point A with a velocity v_A and angle $\alpha = 30^\circ$ to strike the ground at B. If the coefficient of restitution at B is $e = 0.5$. Determine

- a- The initial velocity at A
- b- The magnitude and direction of the velocity at B before striking the ground.
- c- The magnitude and direction of the rebound velocity just after B.
- d- The impact reaction from the ground at B
- e- The range from B to C.



Name: _____ No. _____

(you MUST show your steps in all questions to get the marks)

Question one: Fill in the blanks (9 points)

1. When it is not known in advance how many times a set of statements will be repeated, a(an) value can be used to terminate the repetition.
2. A(n) is a graphical representation of an algorithm.
3. The various devices that comprise a computer system are referred to as
4. The computer programs that run on a computer are referred to as
5. Compilers translates high-level language programs into
6. Special commands like Are processed in the preprocessing phase.
7. All programs can be written in terms of three types of control structures:,,
8. Several statements grouped together in braces ({ and }) are called a(an)

Question two: Multiple-choice questions -solve only 14 questions (14 points)

1. Assume x=5. What is the output of the following statement.
`Printf("%s\n", x%2 ? "NO" : "YES");`
 - a. NO
 - b. compilation error
 - c. YES
 - d. run-time error
2. Writing x=1 for assignment instead of x==1 is a
 - a. logic error
 - b. run-time error
 - c. syntax error
 - d. non of the above
3. In top-down, stepwise refinement, each refinement is a complete representation of the algorithm. (true - false)
4. Linking is performed before loading. (true - false)
5. The linker produces an object file. (true - false)
6. Function printf always begins printing at the beginning of a new line. (true - false)
7. Comments cause the computer to print the text enclosed between /* and */ on the screen when the program is executed. (true - false)
8. All arguments following the format control string in a printf function must be preceded by an ampersand (&). (true - false)
9. A program that prints three lines of output must contain three printf statements. (true - false)
10. The expression (x > y && a < b) is true if either x > y is true or a < b is true. (true - false)
11. Conditions written inside decision symbols always contain arithmetic operators (i.e., +, -, *, /, and %). (true - false)
12. C standard library contains
 - a. programs
 - b. linker
 - c. functions
 - d. non of the above
13. Specifying the execution order of statements by the computer is called
 - a. program control
 - b. execution order
 - c. program order
 - d. non of the above
14. Assume x=4 and y=4. The value of y and x after executing the statement y *= x++ will
 - a. 16, 5
 - b. 16, 4
 - c. 20, 5
 - d. 20, 4
15. The following code prints the values 1 to 10.


```
n = 1;
while (n < 10)
printf ("%d", n++);
```

 - a. true statement
 - b. compilation error occurs
 - c. false statement
 - d. fatal error occurs

16. During the execution of the following code segment, x will take the following values

```
x=1;
```

```
while (x <= 10);
```

```
    x++;
```

a. 1, 2, ... 10

c. nothing

b. 1

d. 10

Question three: Write a single C statement to accomplish each of the following (6 points)

1. Print the value 765.4321 with 3 digits of precision. What value is printed?
2. Multiply the variable **product** by 2 using the ***=** operator.
3. Prompt the user to enter an integer. End your prompting message with a colon (:) followed by a space and leave the cursor positioned after the space.
4. Print the message " This is a C program" with the words separated by tabs.
5. Print "the product is" followed by the value of the integer variable **result**.
6. Assign the sum of x and y to z and increment the value of x by 1 after the calculation.

Question four (5 points)

a. What is the output of the following code segment assuming that x=7 and y=9?

```
if( x < 8 )
```

```
if( y > 8 ) {
```

```
printf ("%d", x);
```

```
}else {
```

```
printf ("%d", y);
```

```
printf ("%d", x);
```

```
}
```

b. Solve it again after removing all braces.

Question five (12 points)

- a. (6 points) (506.467) in radix 8 = (.....) in radix 4
- b. (6 points) (210.122) in radix 3 = (.....) in radix 9

Question six (14 points)

a. (7 points) Write a program that reads a positive integer n , and prints:

- The sum of numbers from 1 to n .
- The even numbers between 1 and n . (print only 6 integers per line)

b. (7 points) Write a flowchart for a program that reads 2 variables x and y , and calculate x raised to the y power. Do not use for loop symbol. Do not use pow function.

August 2012

PE 102

Production Technology

Time Allowed: 2 Hours

PE 102

تكنولوجيا الإنتاج

الزمن المسموح: ساعتان

1. Select the best definition for the following terms:

[8 Points]

Cope	Draft Allowance	Blanking	Diffusion Welding	Plastic Deformation Processes	Composites	Turning	Riveting
Drag	Riser	Reaming	Reverse Extrusion	Cold Roll Welding	Lost-Wax Process	Ceramics	Milling

- (A) A reservoir used as a source of liquid metal to compensate for shrinkage.
- (B) Solid-state welding process that results from the application of heat and pressure, usually in a controlled atmosphere, with sufficient time allowed for solid-state diffusion and coalescence to occur.
- (C) The upper half of an enclosed mold.
- (D) Aggregates of metals, polymers and/or ceramics.
- (E) A process of producing flat and complex shapes with the use of multi-tooth cutting tool.
- (F) The lower half of an enclosed mold.
- (G) Operations that induce shape changes on the workpiece by permanent deformation under forces applied by various tools and dies.
- (H) Compounds of metallic or semi- metals and non-metals.
- (I) Sheet metal cutting operations that involve cutting the sheet metal along a closed outline.
- (J) The slight tapering of mold walls so that a molded part can be removed. Not usually needed for rubber parts.
- (K) Where a cutting tool is used to remove material from a rotating workpiece.
- (L) Where the pattern melts when molten metal hits it.
- (M) A process that requires no subsequent machining or processing.
- (N) Solid-state joining process accomplished by applying high pressure by means of rolls between clean contacting surfaces at room temperature.
- (O) Finishing of drilled holes.
- (P) Unthreaded, headed pin used to join two (or more) parts by passing the pin through holes in the parts and then forming (upsetting) a second head in the pin on the opposite side.

2. The diameter of an Aluminium wire was reduced to 60% of the initial diameter by using a drawing process: [6 Points]
- a. Calculate the number of drawing stages required for this reduction if the maximum percentage of reduction in the cross section area of the wire in each stage was 20 %.
 - b. Find the wire entering velocity if the drawing velocity is 20 m/min.

3. Calculate the machining time for the following process:

[6 Points]

A workpiece of 100 mm length and of 50 mm diameter is machined using a centre lathe in order to reduce the diameter to be 42 mm. During roughing, the maximum possible depth of cut is 1 mm, the cutting speed is 31.4 m/min and the feed is 0.25 mm/rev. The last step of the diameter reduction is a finishing step using a maximum possible depth of cut is 0.5 mm, a cutting speed of 43 m/min and a feed of 0.15 mm/rev.

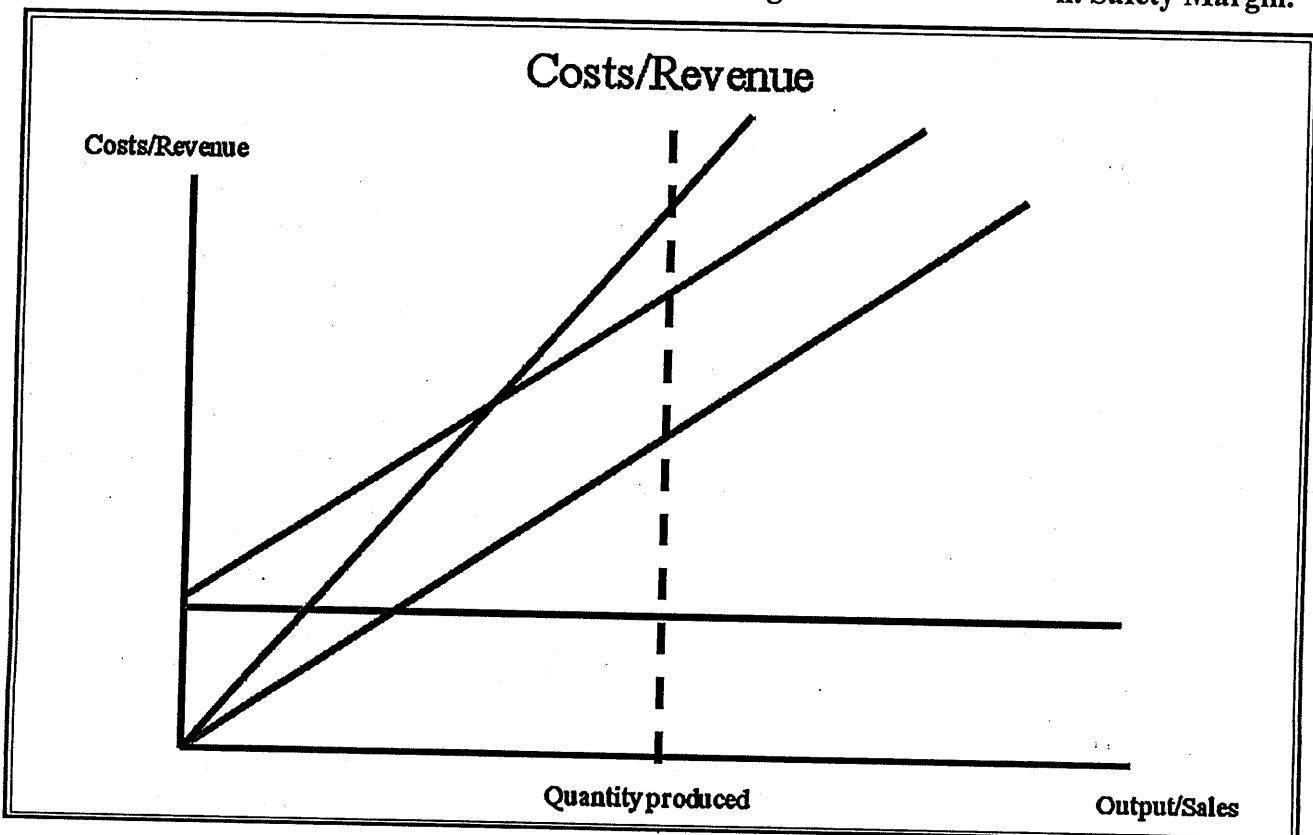
4. Compare the Down Milling and the Up Milling (Using ONLY neat and fully detailed sketches) by showing: [4 Points]

- (a) The direction of the main cutting motion. (b) The direction of the feed motion.
(c) The direction of the chip flow. (d) The variation of the chip thickness.

5. Show the followings on the break even chart:

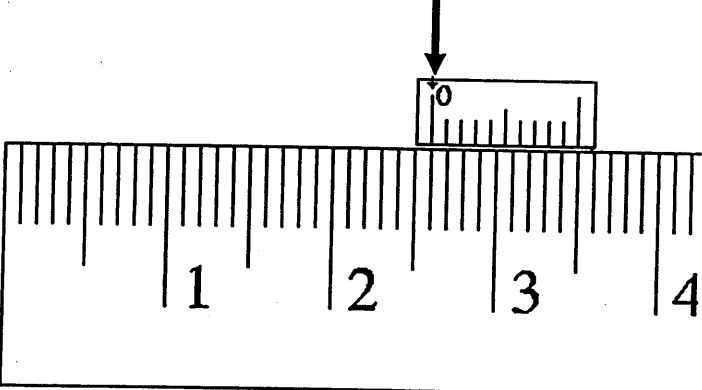
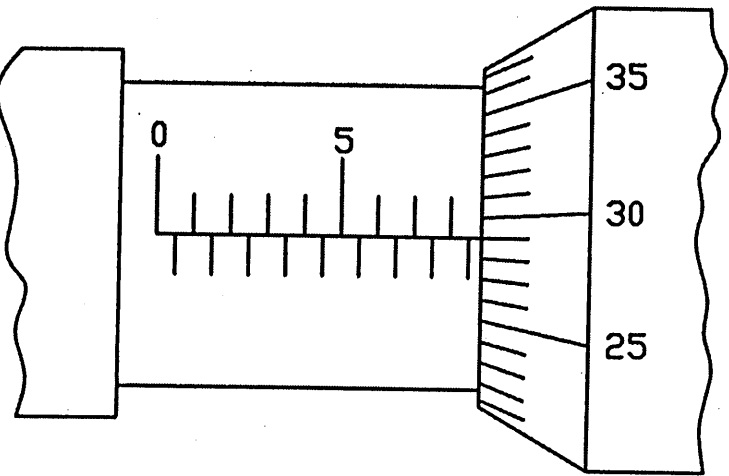
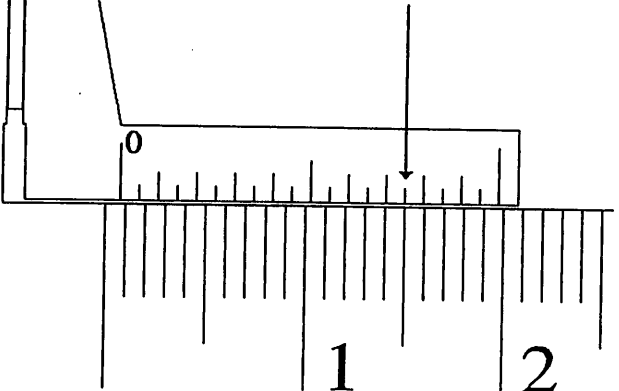
[8 Points]

- a. Fixed Cost. b. Variable Cost. c. Total Cost. d. Revenue.
e. Loss Area. f. Profit Area. g. BEP. h. Safety Margin.



6. Write down the reading in the space to the right of each graph:

[6 Points]

<u>Graph</u>	<u>Reading</u>
	
	
	

7. Check if the following sentences are True or False:

[5 Points]

- (a) The Hot-Chamber Casting is used for the casting of high melting point alloys. []
- (b) The pattern of the Lost Foam Casting process, also called Evaporative-Pattern, does not require draft allowance. []
- (c) Continuous Casting is classified as a casting process for shaping molten metals. []
- (d) Permanent Mold Casting is inexpensive for the production of prototypes. []
- (e) In Centrifugal Casting, most of the impurities and inclusions are closer to the outer diameter. []

8. A petrochemical firm uses three different production processes: A, B and C. The following table shows the fixed and the variable cost of each process: [7 Points]

<u>Process</u>	<u>Annual Fixed Cost</u> <u>(in \$ 100,000)</u>	<u>Variable Cost</u> <u>(\$ per Unit)</u>
A	10	25
B	8	40
C	7.5	50

Based on this table, answer the followings:

- a. Which of these processes is more economical to produce 150,000 units per year?
- b. For each process, calculate the selling volume per year in order to achieve a profit of \$ 5,000,000 per year if the selling price per unit is \$ 120.

Best Wishes

Dr.-Ing. Mohab Hossam

August, 2012

أغسطس 2012

Course title Number: Math 3

اسم المقرر والرقم الكودى له.....رياضيات ٣..

Time allowed: 2 hours.....

الزمن: ٢ ساعة.....

Answer the following questions

1. Solve the following differential equations:

i. $(1 - \cos x) dy + (2y \sin x - \tan x) dx = 0$ (5 marks)

ii. $(y^2 + 3xy) dx = (4x^2 + xy) dy$ (5 marks)

iii. $D^3 y + 3D^2 y - 4y = \sin 2x$ (5 marks)

iv. $D^2 y + 6Dy + 9y = 4x^2 + 3x + 2 + x e^{-3x}$ (5 marks)

v. $x^2 y'' - 2xy' + 2y = 2\ln^2 x - \ln x^2$ (6 marks)

vi. $y'' - 10y' + 25y = \frac{e^{5x}}{\cos^2 x}$ (5 marks)

2. By using the series solution find to the three terms the solution of

the differential equation $(x^2 - 1) \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - y = 0$ (6 marks)

3. i. Find the mass of the lamina given that its density is $\sin^2 x$ and its area is bounded by $y = x^2$, $y = x - 1$, $x = 1$ and $x = 3$ (5 marks)

ii. Evaluate the double integral $\int_0^4 \int_{\sqrt{x}}^2 x \cos y^5 dy dx$ (5 marks)

4. Given that $Z = \ln(pqr)$, where: $p = t^2 \sin^{-1} x$, $q = \frac{x}{t^2}$, $r = \tan^{-1} \left(\frac{x}{t} \right)$ then find $\frac{\partial Z}{\partial t}$ (3 marks)

Bonus question (4 marks)

a. Mention all methods of solutions (do not solve) for the differential equation

i. $(3 - \ln x^2) \frac{dy}{dx} = \left(x^2 + \frac{2y}{x} \right)$ ii. $(x+1) \frac{dy}{dx} = (10 - y)$

b. Show if the following functions are dependent or independent $\ln x$, $\ln x^4$, $\ln \sqrt{x}$

c. Write only the suggested form for y_p (do not solve)

$$\frac{d^2 y}{dx^2} - 9 \frac{dy}{dx} + 14y = 3x^2 - 5 \sin 3x + 7x e^{6x} + 3e^{2x}$$



August, 2012

أغسطس ٢٠١٢

Mathematics (4) MP 202

رياضيات 4

Time allowed: 2 hours

الزمن : ساعتان

Answer all questions

(1) Find the Fourier series of $f(x) = \begin{cases} 0 & -2 < x < 0 \\ x & 0 \leq x < 1 \\ 1 & 1 \leq x < 2 \end{cases}$.. (5 marks)

(2) Find the Laplace transform of the following function (8 marks)

$$f(t) = \begin{cases} 2t+1 & 0 \leq t < 1 \\ 0 & t \geq 1 \end{cases} \quad \text{By two methods}$$

(3) Find the inverse Laplace transform of the following function (4 marks)

$$\left(\frac{5s+7}{s^2+2s+3} \right) e^{-4s}$$

(4) Solve using Laplace transform (8 marks)

$$y'' - 3y' + 2y = e^{-4t} \quad y(0) = 1, y'(0) = 5$$

(5) Given $a = 2i + 3j + k$ and $b = -i + 5j + k$ (15 marks)

(i) Find the angle between the two vectors a and b .

(ii) Evaluate $\text{comp}_b a$ and $\text{proj}_b a$

(ii) evaluate $(a \times b)$ and $(a \cdot b)$.

(6) If $F = xz i + yz j + xy k$ evaluate the following (10 marks)

(i) curl F .

(ii) div F .

(ii) div(curl F).

Best wishes