



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية / النجف



قسم هندسة تقنيات السيارات

المرحلة الثانية

أسئلة الفصل الثاني للعام الدراسي

٢٠١٥-٢٠١٦

شعبة ضمان الجودة والإدارة الجامعية



The Second Semester Exam Questions for the Academic Year 2015-2016
First Semester

Note: Answer Four Questions Only. All Questions have same marks

Q1/ A piezometer and a Pitot tube are tapped into a 3-cm-diameter horizontal water pipe as shown in **Fig.1**, and the height of the water columns are measured to be 20 cm in the piezometer and 35 cm in the Pitot tube (both measured from the top surface of the pipe). Determine the velocity at the center of the pipe.

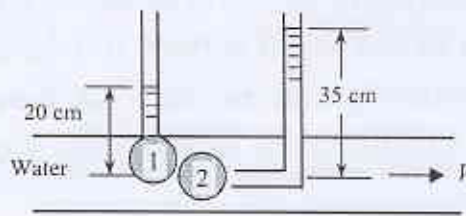


Fig. 1

Q2/ The water level in a tank is 20 m above the ground. A hose is connected to the bottom of the tank, and the nozzle at the end of the hose is pointed straight up as shown in **Fig.2**. The tank cover is airtight, and the air pressure above the water surface is 2 atm gage. The system is at sea level. Determine the maximum height to which the water stream could rise (take the density of water $\rho = 1000 \frac{kg}{m^3}$).

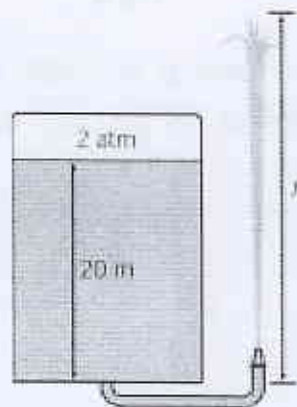


Fig.2

Q3/ A 3-in-diameter horizontal water jet having a velocity of 140 ft/s strikes a curved plate, which deflects the water 180° at the same speed (as shown in Fig.3). Ignoring the frictional effects, determine the force required to hold the plate against the water stream (take the density of water $\rho = 62.4 \text{ lbm/ft}^3$, and momentum flux correction factor $\beta = 1$).

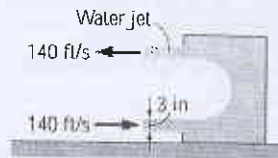


Fig.3

Q4/ Consider a liquid in a cylindrical container in which both the container and the liquid are rotating as a rigid body (solid-body rotation). The elevation difference h between the center of the liquid surface and the rim of the liquid surface is a function of angular velocity ω , fluid density ρ , gravitational acceleration g , and radius R (as shown in Fig. 4). Use the method of repeating variables to find a dimensionless relationship between the parameters. Show all your work.

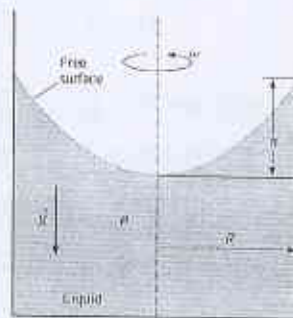


Fig.4



Q5/ Water at 10°C ($\rho = 999.7 \text{ kg/m}^3$ and $\mu = 1.307 \times 10^{-3} \text{ kg/m.s}$) is flowing steadily in a 0.20-cm-diameter, 15-m-long pipe at an average velocity of 1.2 m/s. Determine (a) the pressure drop, and (b) the head loss.

Good Luck

Dhaffer

Lecturer
Dr. Dhaffer M. AL-Shamkhi

Head of Department
Dr. Hiader H.

Assist. Prof. Dr. Hiader H.



ATU University
Technical College Engineering - Annajaf

Dep. : Automotive & Aeronautical Eng. Techniques.
Grade Level: 2nd.
Object: Strength of Materials.
Exam Time: 2 hours.

Note: Endeavor All Questions

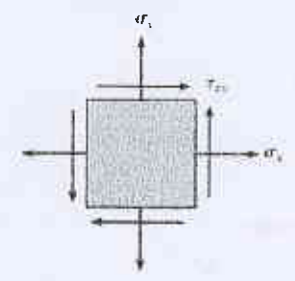
Group (A): Mechanics of Materials Conceptions (40 Marks)

Q1: What are the parameters replacing in circular shaft instead of axial state that is producing by Saint-Venant's? Prove this mathematically. (20 Marks)

Q2: The following element shown in figure (1) be stable without rotate. The value of: (20 Marks)

- (1) Stress (σ_x) equal:
 (A) σ_{av} (B) $\sigma_{av} - \sigma_d$ (C) $\sigma_{av} - \tau_{xy}$ (D) $-\tau_{xy}$
- (2) Stress (τ_{xy}) equal:
 (A) τ_{xy} (B) $-\sigma_d$ (C) $\sigma_d + \tau_{xy}$ (D) Non all.

Figure (1) Un-rotating element



Group (B): Mechanics of Materials Problems (60 Marks)

Q1: Draw S.F.D and B.M.D to one of the cases that is indicating in figure (2) and (3): (20 Marks)

Figure (2) Bearing shaft

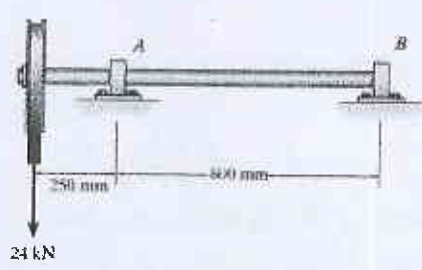
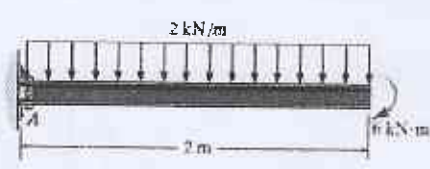


Figure (3) Cantilever beam



Q2: The solid 30-mm-diameter shaft shown in figure (4) is used to transmit the torques applied to the gears. Determine the absolute shear stresses on the shaft. (20 Marks)

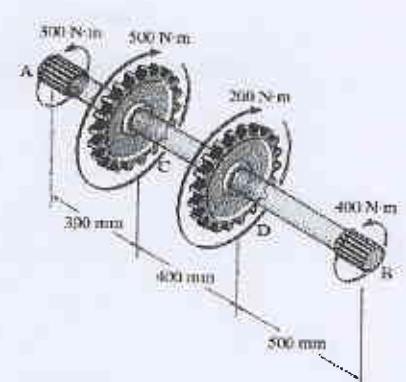


Figure (4) Transmitting shaft





ATU University
 Technical College Engineering - Annajaf

Dep. : Automotive & Aeronautical Eng. Techniques.
 Grade Level: 2nd.
 Object: Strength of Materials.
 Exam Time: 2 hours.

Q3: The state of stresses is referring to in figure (5) on the element. Determine (a) the principal stress and (b) the maximum in-plane shear stress and average normal stress at the point. Specify the orientation of the element in each case. Sketch the results on each element. (20 Marks)

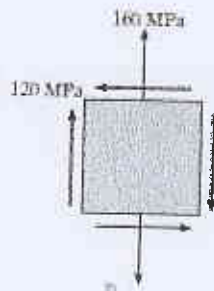


Figure (5) Rotating element

GOOD LUCK



M.A

Examiner

A.Lecturer: Mohammed A. Abass

Ali S. Baqir
 Head of Aeronautical Dep.
A. Prof. Dr. Ali S. Baqir

Haider H. Al-Abdili
 Head of Automobile Dep.
Dr. Haider H. Al-Abdili



القسم : قسم الاتصالات / السيارات
المرحلة : الثانية
المادة : حاسوبية / ح
وقت الامتحان : ساعتان
التاريخ : ٢٠١٦ / ٤ / ٢٧

امتحان الفصل الثاني للعام الدراسي ٢٠١٥ - ٢٠١٦

Answer All Questions

Q1: A: What is the result of execution of the following functions: (10 degree)

1. math.Sqrt(64).
2. 7 * math.Pow(3, 3).
3. (math.Round(676.37)) / 2.
4. math.max (5, 90) + 3.
5. math. min(575, 8) + 4.

B: Define the following :

- 1.Packet 2.ARP 3.Band Width 4.Digital signature 5.firewall (20 degree)

Q2: Give only one line of code that can do the following : (20 degree)

1. Change the dimension of matrix (Dim x(4,7) as integer) to have 8 row.
2. Define **vector** with 6 element.
3. Print in list box the following on same line (Visual DotNet 2008)
4. Change **text** color of **Button** to **Red**
5. Enable **textbox** to write **many lines**.

Q3: A: Give the correct representation in visual basic for the following equations: (15 degree)

1. $\cos(t^2)$.
2. $(1+\sin(3t))$.
3. $5\tan(t) + e^t$.
4. $|23 + x|$.
5. $4x + 9y$.

B: Trace the following program and give the content of listbox2. (5 degree)

```
Private Sub Button1_Click()
    Dim i, y(5) As Integer
    Dim x(5) As Integer = [5 5 6 6 7 7]
    For i = 5 To 0 Step -1
        ListBox2.Items.Add(x(i))
    Next
End Sub
```

Q4:A: Fill blanks with the missing codes for the following programs:

(18 degree)

1. This program display the elements of main digonal.

```
Private Sub Button1_Click()  
    Dim x1(,) As Integer = {{5, 0, 0}, {0, 10, 0}, {0, 0, 15}}  
    For i = 0 To -----A-----  
        For j = 0 To -----B-----  
            If -----C----- Then  
                ListBox1.Items.Add(x1(i, j))  
            End If  
        Next  
    Next  
End Sub
```

2. This program find the maximum number in matrix.

```
Private Sub Button1_Click()  
    Dim x(2, 2) as integer = ( {10,20,30},{40,50,60},{70,80,90} )  
    Dim i, j, max As Integer  
    max = ----D-----  
    For i = 0 To 2  
        For j = 0 To 2  
            If x(i, j) -----E----- max Then  
                max = -----F-----  
            End If  
        Next  
    Next  
    MsgBox(max)  
End Sub
```

B :write program that find the multiplication of the following matrices x(3,4) and y(4,8).

(12 degree)

بالتوقيع


مدرس المادة
م.م. علياء عبد الحسين



2-2

27/04/2016
رئيس القسم:
ليث وسيد

قسم الميكانيكا
٢٠١٦

Ministry of Higher Education and Scientific Research
Al-Furat Al-Awsat Technical University
Tech. Eng. College – Najaf/Automobile Tech. Eng. Dept.
Second semester examination 2015-2016



Subject: Mathematics

Class: 2st year

Time: 2 hours

Date: 28 / 4 / 2016

Notes// 1. Please read the questions carefully, 2. Answer all question

Q1: a) If $Z = \sin(x+y)^2$ Show that : $\frac{Z_x}{Z_y} = \frac{2x+y}{x+2y}$ (10 Degree)

Q1: b) If $W = \frac{2y}{y + \cos x}$ Find W_x and W_y ? (15 Degree)

Q2: a) If $Z=f(t)$, $t = \frac{x+y}{xy}$ then show that $x^2 \frac{\partial z}{\partial x} = y^2 \frac{\partial z}{\partial y}$ (10 Degree)

Q2: b) If $w = \sqrt{x^2 + y^2 + z^2}$, $x = e^r \cos \theta$, $y = e^r \sin \theta$, $z = e^\theta$ find $\frac{\partial w}{\partial r}$, $\frac{\partial w}{\partial \theta}$ (15 Degree)

Q3: a) Solve $\frac{dy}{dx} = \frac{x\sqrt{1-y^2}}{1+x^2}$ when $x=0$, $y=1$ (10 Degree)

Q3: b) Solve $\frac{dy}{dx} = \frac{y}{-3x+y^2}$ when $x=1$, $y=1$ (15 Degree)

Q4: a) Solve $5y y'' + 10y^2 = 0$ when:
 $x=0$, $y=1$
 $x=0.5$, $y=2$ (10 Degree)

Q4: b) Solve $y'' - 4y = \sin x$ (15 Degree)



Dr. Eng. Mahdi Hatf Kadhum
The Teacher

المادة : Internal Combustion Engines
المرحلة : الثانية
وقت الامتحان : ساعتان
التاريخ : 2016 / 4 / 30



وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
الكلية التقنية الهندسية / النجف
قسم هندسة تقنيات السيارات

امتحان الفصل الثاني للعام الدراسي 2015-2016

Q1.

- A. Choose the correct answer which achieve the sentence of the following :
- The valve that most commonly used in I.C engines called
a. sleeve valve b. poppet valve c. rotary valve d. disc valve
 - When two or more intake valves instead of one used in I.C engines, the valve will be
a. lighter b. smaller c. a & b d. bigger
 - Multipoint port injector systems better than carburetors at given consistent
a. AF ratio b. engine speed c. fuel flow d. air flow
 - The small economy engines that do not require high power needs to..... throat carburetors.
a. large b. small c. medium d. a & b
 - The compressor mounted in the intake system of an engine, which used to raise the pressure of incoming air is called
a. turbine b. supercharger c. turbocharger d. b or c
 - Injection pressure for CI engines is that required for SI engines.
a. higher than b. smaller than c. equal to d. either b or c
 - Gasoline is one types of liquid fuels that consist mainly from elements.
a. carbon b. hydrogen c. oxygen d. a & b
 - The equivalence ratio is greater than one if
a. $AF_{actual} > AF_{theoretical}$ b. $AF_{theoretical} > AF_{actual}$ c. $FA_{actual} > FA_{theoretical}$ d. b or c
 - The combustion that occurs in I.C engines is called
a. combustion with stationary flam b. surface combustion c. slow combustion
d. combustion with explosion flame.
 - Propyl alcohol consisting of atoms of Hydrogen.
a. 8 b. 7 c. 3 d. 1

(25 marks)

Q2. A four-stroke cycle SI engine with 8 cylinder has 6.2-liters. It designed to have a maximum speed of 6500 rpm. At this speed, volumetric efficiency is 88%. The engine is equipped with a four-barrel carburetor, each barrel having a discharge coefficient of $C_{Dt} = 0.95$. The tube discharge coefficient $C_{Dc} = 0.85$ and the capillary tube height differential is 1cm. The fuel used is gasoline at $FA = 1:15$, density of gasoline is 750 kg/m^3 . Calculate:

- Minimum throat diameter needed in each carburetor venturi.
- Fuel capillary tube diameter needed for each venturi throat.

(25 marks)



Q3.

- A. A 2.5 liters turbocharger engine with four cylinder operating at 4000 rpm. The engine exhaust condition are 1200 °C and 550 kpa , while the tailpipe pressure is 250 kpa and the actual tailpipe temperature is 950 °C . The isentropic efficiency of compressor is 95% and the overall efficiency of turbocharger is 70%. Calculate the isentropic efficiency of turbine and the mechanical efficiency between turbine and compressor.

(20 marks)

Q4. Answer three branches only

- A. Fuel is represented by the general formula C_xH_{2x} . If the equivalence ratio is 0.8 , determine the actual air-fuel ratio . (10 marks)
- B. List in the sectors of energy use in the world with details. (10 marks)
- C. Explain the Self-ignition characteristics of fuels with graph shown effect of SIT on ID. (10 marks)
- D. Explain with graph the flow of air-fuel mixture through the intake valve into an engine cylinder. (10 marks)



"ALL THE BEST"

م. م. بلاسم عبد الأمير القرشي
مدرس المادة

د. حيدر حسن العبدلي
رئيس القسم

المادة: تكنولوجيا المحركات
المرحلة : الثانية
الزمن: ساعتان
التاريخ: ٢٠١٦/٤/٢٦



وزارة التعليم العالي والبحث العلمي
جامعة الفرات الأوسط التقنية
الكلية التقنية الهندسية النجف
قسم هندسة السيارات

امتحان الفصل الثاني للعام الدراسي ٢٠١٦/٢٠١٥

Answer All Questions:

Q1\ Complete the following:

(20 M)

- 1- Fuel pressure is controlled by the in a mechanical fuel pump.
- 2- Fuel pump pressure for a gasoline injection system should be approximately to kPa.
- 3- The carburetor..... system provides the engine's air-fuel mixture at speeds below about rpm or 20 mph (32 km/h)
- 4- Many EFI systems can maintain a fuel pressure as high as kPa.
- 5- The carburetor.....rides on top of the fuel to open and close the needle valve as needed.
- 6- When an EFI system is in..... loop, the computer uses engine sensor information to control the system.
- 7- The system is designed to supply an extremely rich air-fuel ratio to aid cold engine starting.
- 8- The airflow sensor measures
- 9- A vacuum choke unloader uses.....
- 10- TBI pressure regulator consists of, and

Q2\ Answer all the followings:

(20 M)

- 1- What are the main differences between the throttle body for multipart injection and throttle body injection?
- 2- Give the differences between indirect and direct injection?
- 3- What are the main differences between mechanical and electric fuel pumps?
- 4- Describe the difference between the primary and secondary of a carburetor?

Q3\ Answer all the followings:

(20 M)

- 1- What are the advantages of Gasoline Injection?
- 2- What are the functions of fuel accumulator?
- 3- What is the purpose of an idle air bleed?
- 4- Why is injector fuel volume output important?



Q4\ Define five only of the following identities: (20 M)


- 1- Injector pulse width
- 2- Carburetor flooding
- 3- Hydraulic fuel injection
- 4- Airflow sensor
- 5- Throttle position sensor
- 6- High-speed jet

Q5\ Choose Three only of the following: (20 M)

- 1- List and briefly explain the five major parts of a carburetor.
 - 2- List the parts typically included in an EFI fuel delivery system.
 - 3- List and explain four types of automatic choke.
 - 4- Explain the operation of oxygen sensor.
-


Examiner
A.Lec. Hussein Al-Abidi

Good Luck


Head of Department
Dr. Hyder Hassan



Subject: Automobile Electricity Ministry of Higher Education
Class: 2nd and Scientific Research Date: 5/5/2016
Time: 2 hours Al-Furat Al-Awsat Technical University
Engineering Technical College / Najaf

Q.1\Define **five** only: (20 marks)
1- Shunt wound 2- Emergency light 3- Ignition coil 4- Commutator
5- Dwell 6- one-way clutch

Q.2 \Choose the correct answer: (20 marks)
1- The minimum starting speed is about..... rev/min.
a) 300 b) 500 c) 200 d) 100
2- Some of modern ignition systems able to supply up to kV to the spark plugs.
a) 40 b) 8 c) 20 d) 18
3- The maximum brightness allowable for low beams is candle power.
a) 2,000 b) 20,000 c) 20 d) 200,000
4- Under any condition of an ideal advance angle is required to ensure maximum pressure is achieved in the cylinder just after top dead center.
a) engine temperature and load b) engine speed and temperature
c) engine speed and load d) engine speed and pressure
5- With a starter (pinion-to-ring) gear ratio of....., the motor must therefore, be able to produce a high torque to drive the crankshaft.
a) 10 : 1 b) 18:1 c) 20:1 d) 8:1

Q.3 /A/ Draw the complete circuit of starter solenoid (10 M)

Q.3 /B/ Explain in detail the different types of pulse generator (10 M)

Q.4 /A/ Draw the complete circuit of electronic ignition system (10 M)

Q.4 /B/ Explain the operation and function of the turn signal system (10 M)


Q.5 / What is the function of each one of the following: (20 marks)

A- Twin cooling fans and motors B- Spark plug
C- High beams light D- Dimmer switch E- Ballast resistor


Examiner

Ahmed Dheyaa Rabee




Head of Department

Dr. Haider Hasan

Subject: Automobile Electricity
Class: 2nd
Time: 2 hours

Ministry of Higher Education
and Scientific Research
Al-Furat Al-Awsat Technical University
Engineering Technical College / Najaf

Date: 5/5/2016

Q.1/ Define five

- 1- Shunt winding
 - 2- Emergency light
 - 3- Ignition coil
 - 4- Commutator
 - 5- Dwell
 - 6- one-way clutch
- (20 marks)

Q.2/ Choose the correct answer:

- 1- The minimum starting speed is about..... rev/min. (20 marks)
 - a) 300
 - b) 500
 - c) 200
 - d) 100
- 2- Some of modern ignition systems able to supply up to kV to the spark plugs.
 - a) 40
 - b) 8
 - c) 20
 - d) 18
- 3- The maximum brightness allowable for low beams is candle power.
 - a) 2,000
 - b) 20,000
 - c) 20
 - d) 200,000
- 4- Under any condition of an ideal advance angle is required to ensure maximum pressure is achieved in the cylinder just after top dead center.
 - a) engine temperature and load
 - b) engine speed and temperature
 - c) engine speed and load
 - d) engine speed and pressure
- 5- With a starter (pinion-to-ring) gear ratio of....., the motor must therefore, be able to produce a high torque to drive the crankshaft.
 - a) 10:1
 - b) 18:1
 - c) 20:1
 - d) 8:1

Q.3 /A/ Draw the complete circuit of starter solenoid (10 M)

Q.3 /B/ Explain in detail the different types of pulse generator (10 M)

Q.4 /A/ Draw the complete circuit of electronic ignition system (10 M)

Q.4 /B/ Explain the operation and function of the turn signal system (10 M)

Q.5/ What is the function of each one of the following: (20 marks)

- A- Twin cooling fans and motors
- B- Spark plug
- C- High beams light
- D- Dimmer switch
- E- Ballast resistor

Examiner

Head of Department

Dr. Haider Hasan

