Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Sc./B.C.Tech.)
Mid-Term Examination
English
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

QUESTION I. **(20 Marks)**

Read the passage below and answer the following questions.

A. A water is the giver and, at the same time, the taker of life. It covers most of the surface of the planet we live on and features large in the development of the human race. On present predictions, it is an element that is set to assume even greater significance.

B. Throughout history, water has had a huge impact on our lives. Humankind has always had a rather ambiguous relationship with water, on the one hand receiving enormous benefit from it, not just as a drinking source, but as a provider of food and a means whereby to travel and to trade. But forced to live close to water in order to survive and to develop, the relationship has not always been peaceful or beneficial. In fact, it has been quite the contrary. What has essentially been a necessity for survival has turned out in many instances to have a very destructive and life-threatening side.

C. Through the ages, great floods alternated with long periods of drought have assaulted people and their environment, hampering their fragile fight for survival. The dramatic changes to the environment that are now a feature of our daily news are not exactly new: fields that were once lush and fertile are now barren; lakes and rivers that were once teeming with life are now long gone; savannah has been turned to desert. What perhaps is new is our naïve wonder when faced with the forces of nature.

D. Today, we are more aware of climatic changes around the world. Floods in far-flung places are instant hews for the whole world. Perhaps these events make us feel better as we face the destruction of our own property by floods and other natural disasters.

E. In 2002, many parts of Europe suffered severe flood damage running into billions of euros. Properties across the continent collapsed into the sea as waves pounded the coastline wreaking havoc with sea defences. But it was not just the seas. Rivers swollen by heavy rains and by the effects of deforestation carried large volumes of water that wrecked many communities.

F. Building stronger and more sophisticated river defences against flooding is the expensive short-term answer. There are simpler ways. Planting trees in highland areas, not just in Europe but in places like the Himalayas, to protect people living in low-lying regions like the Ganges Delta, is a cheaper and more attractive solution. Progress is already being made in convincing countries that the emission of carbon dioxide and other greenhouse gases is causing considerable damage to the environment. But more effort is needed in this direction

G. And the future? If we are to believe the forecasts, it is predicted that two-thirds of the world population will be without fresh water by 2025. But for a growing number of regions of the world, the future is already with us. While some areas are devastated by flooding, scarcity of water in many other places is causing conflict. The state of Texas in the United States of America is suffering a shortage of water with the Rio Grande failing to reach the Gulf of Mexico for the first time in 50 years in the spring of 2002, pitting region against region as they vie for water sources. With many parts of the globe running dry through drought and increased water consumption, there is now talk of water being the new oil.

H. Other doom-laden estimates suggest that, while tropical areas will become drier and uninhabitable, coastal regions and some low-lying islands will in all probability be submerged by the sea as the polar ice caps melt. Popular exotic destinations now visited by countless tourists will become no-go areas. Today's holiday hotspots of southern Europe and elsewhere will literally become hotspots - too hot to live in or visit. With the current erratic behaviour of the weather, it is difficult not to subscribe to such despair.

I. Some might say that this despondency is ill-founded, but we have had ample proof that there is something not quite right with the climate. Many parts of the world have experienced devastating flooding. As the seasons

revolve, the focus of the destruction moves from one continent to another. The impact on the environment is alarming and the cost to life depressing. It is a picture to which we will need to become accustomed.

Questions 1-7 : Choose the correct heading for paragraphs A-G from the list of headings below.

1. Paragraph A
2. Paragraph B
3. Paragraph C
4. Paragraph D
5. Paragraph E
6. Paragraph F
7. Paragraph G

List of Headings

i	Environmental change has always been with us
ii	The scarcity of water
iii	Rivers and seas cause damage
iv	Should we be despondent? Or realistic?
v	Disasters caused by the climate make us feel better
vi	Water, the provider of food
vii	What is water?
viii	How to solve flooding
ix	Far-flung flooding
x	Humans' relationship with water

Questions 8-10: Choose the correct letter A, B, C or D.

8. According to the text, planting trees
   (A) has to be co-ordinated internationally.
   (B) is more expensive than building sea and river defences.
   (C) is a less expensive answer to flooding than building river defences.
   (D) is not an answer to the problem of flooding in all regions.
9. By 2025, it is projected that
   (A) at least half the world population will have fresh water.
   (B) the majority of the world population will have fresh water.
   (C) one-third of the world population will have fresh water.
   (D) fresh water will only be available to half of the world population.
10. According to the text, in the future low-lying islands
   (A) will still be habitable. (B) will not be under water.
   (C) are likely to be under water. (D) will probably not be under water.

QUESTION II. **(20 Marks)**

II. (A). There is a verb in the wrong tense in each item. Find the error and correct it. Just write down the number and the answer.

1. The bus will not arrive until 7:30 in the evening.
2. What are you doing this time next year?
3. I think it is being extremely hot there.
4. Tonight we will hold an international evening, with lots of food from different countries.
5. When I will find the answer, I will let you know.
6. By the year 2021, the population of Australia will have been reaching a maximum of 23.3 million.
7. I will text you before we are setting off.
8. Have a great time and we are going to see you when you get back.
9. The prime minister opens the debate in parliament tomorrow.
10. If you are career-driven, you need a course relevant to your profession.

II. (B). Put the verbs into the correct form (will, going to, simple present or present continuous).

1. I love London. I ---------- (probably / go) there next year.
2. Our train ---------- (leave) at 4:47pm.
3. What ---------- (you / wear) at the party tonight?
4. I haven't made up my mind yet. But I think I ---------- (find) something nice in my mum's wardrobe.
5. This is my last day here. I ---------- (go) back to England tomorrow.
6. Hurry up! The conference ---------- (begin) in 20 minutes.
7. My horoscope says that I ---------- (meet) an old friend this week.
8. Look at these big clouds! It ---------- (rain).
9. Here is the weather forecast. Tomorrow ---------- (be) dry and sunny.

10. What does a blonde say when she sees a banana skin lying just a few meters in front of her?
Oh dear! I ---------- (slip)!

QUESTION III. (20 Marks)

III. Fill the gaps in the following paragraph using the words in the box.

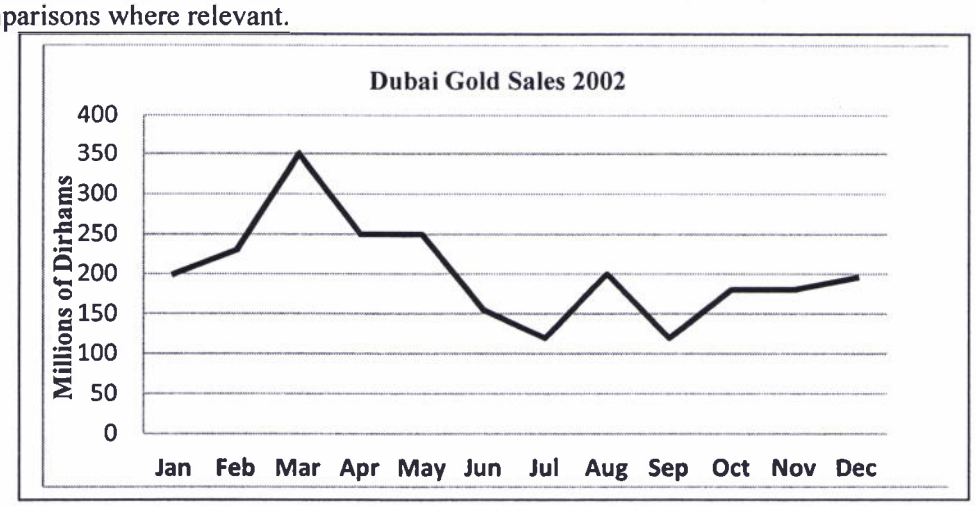
or	could	be	block	in	vision	turns	matter
bit	sense	relied	echoes	One	without	adapted	obstacles
the	technique	measure	engineers				

Blind humans sometimes seem to have an uncanny sense of ----(1)---- in their path. It has been given the name 'facial----(2)----', because blind people have reported that it feels a ----(3)---- like the sense of touch, on the face. ----(4)---- report tells of a totally blind boy who ----(5)----ride his tricycle at good speed round the ----(6)---- near his home, using facial vision. Experiments showed that, ----(7)---- fact, facial vision is nothing to do with touch ----(8)---- the front of the face, although the sensation may ----(9)---- referred to the front of the face, like ----(10)---- referred pain in a phantom limb. The sensation of facial vision, it ----(11)---- out, really goes in through the ears.

Blind people, ----(12)---- even being aware of the fact, are actually using ----(13)---- of their own footsteps and of other sounds, to ----(14)---- the presence of obstacles. Before this was discovered, ----(15)---- had already built instruments to exploit the principle, for example to ----(16)---- the depth of the sea under a ship. After this ----(17)---- had been invented, it was only a ----(18)---of time before weapons designers ----(19)---- it for the detection of submarines. Both sides in the Second World War ----(20)---- heavily on these devices, under such codenames as Asdic (British) and Sonar (American), as well as Radar (American) or RDF (British), which uses radio echoes rather than sound echoes.

QUESTION IV. (20 Marks)

IV. (A). The line graph below shows estimated sales of gold in Dubai for 12 months in 2002 in millions of Dirhams. Summarize the information by selecting and reporting the main features, and make comparisons where relevant.



IV. (B). Answer the following questions.

1. How do you usually spend your weekends?
2. What do people usually do on the weekends in your country?
3. What do you usually do on weekends?
4. Why are weekends important to you?
5. What are you going to do next weekends?

QUESTION V. (20 Marks)

V. Write the following topic:

"Some people say that computers have made life easier and more convenient. Other people say that computers have made life more complex and stressful. To what extent do you agree or disagree?" (Write at least 250 words.)

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Sc./B.C.Tech.)
Mid Term Examination
Structured Computer Organization + Assembly Language (CST-301)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. (a) State whether the following statements are **TRUE** or **FALSE**. **(5 marks)**

(i) Flip-flops can be combined in groups to create registers, which hold data types larger than 1 bit in length.
(ii) MDR stores the location or address of operand for read or write memory operation.
(iii) A three-to-eight decoder circuit used OR gate as the final stage.
(iv) A synchronous bus has a line driven by a crystal oscillator.
(v) Register addressing is a technique for specifying global variables.

1. (b) Choose the correct or the best alternative in the followings: **(5 marks)**

(i) _____ is a region of memory containing the program.
A. Constant pool B. Method area C. Local variable frame D. Operand stack

(ii) A method for specifying an operand in memory is just to give its full address this mode is called _____.
A. indexed addressing B. register addressing C. indirect addressing D. direct addressing

(iii) The control store's memory address register is called _____.
A. MIR B. MBR C. MPC D. MBRU

(iv) There are _____ OR gates in 4 x 3 memory.
A. 22 B. 3 C. 18 D. 8

(v) _____ routes its single input signal to store of 2^n output, depending on the value of n control lines.
A. Demultiplexer B. Multiplexer C. Decoder D. Comparator

1. (c) Match each of items in List-1 with the appropriate answer in List-2. **(5 marks)**

	List-1		List-2
(i)	Instruction set architecture level	(A)	Level 1
(ii)	Assembly language level	(B)	Level 2
(iii)	Microarchitecture level	(C)	Level 3
(iv)	Problem-oriented language level	(D)	Level 4
(v)	Operating system machine level	(E)	Level 5

2. Define **ANY FOUR** of the followings: **(8 marks)**

(i) Translator
(ii) Ripple carry adder
(iii) Noninverting buffer
(iv) MIR
(v) Bus

3. (a) Briefly explain about the operation of an asynchronous bus. **(4 marks)**

3. (b) Draw a 64M x 8 bit memory chip using n x n matrices. Calculate the size of this memory chip in bit. **(4 marks)**

3. (c) A computer with a 50-MHz bus requires four cycles to read a word. The time taken after the address is stable to get a word from memory takes 54 nsec. The address output delay (T_{AD}) is 11 nsec. How much the data setup time (T_{DS})? **(4 marks)**

3. (d) Draw a logic diagram for 2 x 2 memory organization. **(5 marks)**

3. (e) Draw a circuit diagram for the new 1-bit ALU to compute any one of the four functions namely A NOR B, A XOR B, A AND B and A+B depending on whether the functions select input lines. **(8 marks)**

4. (a) How many microinstructions do MIC-1 and MIC-2 take to execute the following Java Statement. "x = y - z;" **(4 marks)**

4. (b) Convert the following Java code to IJVM instructions. **(5 marks)**

```
x = y;
z = y - 1;
while ( z <> 0) do{
        x = x + y;
        z = z - 1; }
```

4. (c) Write the detail of MIR to represent the following IJVM instructions: **(7 marks)**

Label	Operations
iinc 1	H= LV
iinc 2	MAR= MBRU+ H; rd
iinc 3	PC= PC+1; fetch
iinc 4	H= MDR
iinc 5	PC= PC+1; fetch
iinc 6	MDR= MBR+ H; wr;
Main1	PC=PC+1; fetch; goto(MBR)

5. (a) Compare 0-,1-,2- and 3- address machine by writing program to compute

X= (A + B) / (C - D) + E

for each of the four machines. The instructions available for use are as follows:

0-address	1-address	2-address	3-address
PUSH M	LOAD M	MOV (X=Y)	MOV (X=Y)
POP M	STORE M	ADD (X=X+Y)	ADD (X=Y+Z)
ADD	ADD M	SUB (X=X-Y)	SUB (X=Y-Z)
SUB	SUB M	MUL (X=X*Y)	MUL (X=Y*Z)
MUL	MUL M	DIV (X=X/Y)	DIV (X=Y/Z)
DIV	DIV M		

M is a 16 bits memory address and X, Y, Z are either 16 bit addresses or 4 bit registers. With 8 bit opcodes and instruction lengths that are multiple of 4 bits, how many bits does each machine need to compute X? **(12 marks)**

5. (b) Convert the following formulas from reverse Polish notation to infix. **(4 marks)**

(i) ABCDE + * * /

(ii) ABC*+D –

(iii) AB +C+D+

(iv) AB +CD–* EF –G H + * /

6. Answer the following questions. **(6 marks)**

(i) Give 2 examples of illegal moves.
(ii) Name the four segment registers.
(iii) Write the hexadecimal and binary representation of the character 'W', using the ASCII table.

7. (a) Write an assembly language program that display a sequence:

5ZYX 4WVU 3TSR 2QPO 1NML on the screen. (Hint: use nested loop and stack) **(7 marks)**

7. (b) Write an assembly language program that inputs a string of up to 30 characters and a character that can be searched from the console. Find the count of searched character in the input string and display it. **(7 marks)**

The screen display should resemble the following:

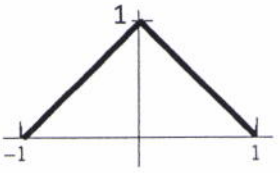
```
Enter a string      : Computer University
Enter a character   : r
Count               : 2
```

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Sc./B.C.Tech.)
Mid-Term Examination
Mathematics of Computing III (CST-302)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours.**

1. (a) Find the Fourier series of the function $f(x) = \begin{cases} \pi - x, & 0 < x < \pi \\ -\pi - x, & -\pi < x < 0 \end{cases}$, which is assumed to have the period 2π. Sketch or graph the partial sums up to that including $\cos 5x$ and $\sin 5x$.



(b) Is the function (shown in figure) even or odd or neither even nor odd? Find its Fourier series. Show details of your work.

2. (a) Find the Fourier sine integral of

$$f(x) = \begin{cases} 1, & \text{if } 0 < x < 1. \\ 0, & \text{if } x > 1. \end{cases}$$

(b) Find the Fourier cosine transform for $f(x) = x$, if $0 < x < 2$, $f(x) = 0$, if $x > 2$.

(c) Let $z_1 = -2 + 11i$, $z_2 = 2 - i$. Find (i) $(z_1 + z_2)(z_1 - z_2)$, (ii) $z_1^2 - z_2^2$ showing the details of your work in the form $x + iy$.

3. (a) Find all roots of $\sqrt[4]{i}$ and graph these roots in the complex plane.

(b) Is the function $v = (2x + 1)y$ harmonic? If your answer is yes, find a corresponding analytic function $f(z) = u(x, y) + iv(x, y)$.

4. (a) Show that $\sin z = \sin x \cosh y + \mathrm{i} \cos x \sinh y$.

(b) Three screws are drawn at random from a lot of 100 screws, 10 of which are defective. Find the probability of the event that all 3 screws drawn are non-defective, assuming that we draw (i) with replacement, (ii) without replacement.

(c) Let X [millimeter's] be the thickness of washers. Assume that X has the density $f(x) = kx$ if $0.9 < x < 1.1$ and 0 otherwise. Find k. What is the probability that a washer will have thickness between 0.95 mm and 1.05 mm?

5. (a) Find the mean and variance of the random variable X with probability function or density

$$f(x) = Ce^{-\frac{x}{2}} \quad (x = 0).$$

(b) If on the average, 5 cars enter a certain parking lot per minute, what is the probability that during any given minute 6 or more cars will enter the lot?

(c) Suppose that in the production of 60-ohm radio resistors, non-defective items are those that have a resistance between 58 and 62 ohms and the probability of a resistor's being defective is 0.1 %. The resistors are sold in lots of 200, with the guarantee that all resistors are non-defective. What is the probability that a given lot will violate this guarantee? (Use the Poisson distribution).

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Sc./B.C.Tech.)
Mid-Term Examination
Data and Computer Communications I (CST-303)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. Choose the correct answer to the following questions. **(20 marks)**

a. A transmission media can have signal impairment because of
(a) Noise (b) Attenuation
(c) Distortion (d) All of above

b. Which of the following is not a guided medium?
(a) Twisted pair cable (b) Coaxial cable
(c) Fiber optic cable (d) Atmosphere

c. Which quantization level results in a more faithful reproduction of the signal?
(a) 2 (b) 8
(c) 16 (d) 32

d. In ---------- transmission, bits are transmitted over a single wire, one at a time.
(a) Asynchronous Serial (b) Synchronous Serial
(c) Parallel (d) (a) and (b)

e. In Go-back-N ARQ, if frames 4,5, and 6 are received successfully, the receiver may send an ACK ---------- to the sender.
(a) 6 (b) 7
(c) 5 (d) Any of the above

f. Membership in a VLAN can be based on ----------.
(a) MAC address (b) IP address
(c) Port address (d) All of the above

g. IEEE has defined the specifications for a wireless LAN, called ---------- which cover the physical and data link layers.
(a) IEEE 802.5 (b) IEEE 802.11
(c) IEEE 802.2 (d) IEEE 802.3

h. Which of the following protocol is/are defined in Transport layer?
(a) FTP (b) TCP
(c) UDP (d) (b) and (c)

i. The ---------- translates internet domain and host names to IP address.
(a) Domain Name System (b) Routing information protocol
(c) Network time protocol (d) Internet relay chat

j. When displaying a web pages, the application layer uses the
(a) HTTP protocol (b) FTP protocol
(c) SMTP protocol (d) None of the mentioned

2. Write short notes on **ANY FOUR** of the followings. **(20 marks)**
   (a) Thermal noise
   (b) VSAT system
   (c) Half duplex and Full duplex transmission
   (d) ASK (Amplitude Shift Keying)
   (e) Stop-and-Wait ARQ
   (f) Two link configurations in HDLC

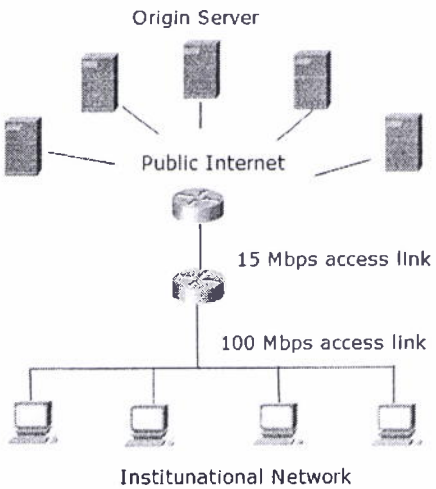
3.(a) How do you choice the topology at designing a LAN? **(10 marks)**

(b) List the requirements of Wireless LAN and describe three categories according to the transmission techniques. **(10 marks)**

4.(a) How do you understand the delay in Packet-Switched Network? List the type of delay. **(10 marks)**

(b) What is the difference between viruses, worms, Trojans, botnet and malware? **(10 marks)**

5. (a)The following figure shows two networks that are institutional network and public network. The router in the institutional network and a router in the internet are connected by a 15Mbps link. Suppose that the average size is 1Mbits and that the average request rate from the institution's browser to the origin server is 20 requests per second. Suppose that access delays in two routers are 2 seconds on average. Calculate the traffic intensity on the LAN and access link. And then, without upgrading the access link, we installed a web cache in the institution network. Let consider the hit rates such as 40 % satisfied the cache and 60% satisfied the origin server on 10 milliseconds. Finally, calculate the average delay in two networks.



(10 marks)

(b) Discuss resource records (RRs) in DNS distributed database and how to illustrate four- turples in RRs? **(10 marks)**

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Tech)
Mid-Term Examination
Electronics I (CT-304)
March, 2018

Answer All Questions **Time allowed: 3 Hours**

1(a) Determine the forward voltage and forward current for the diode in Figure 1(a) for each of the diode models. Also find the voltage across the limiting resistor in each case. Assume $r'_d = 10\Omega$ at the determined value of forward current. **(10 Marks)**

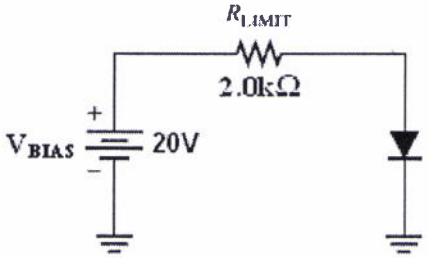


Figure 1(a)

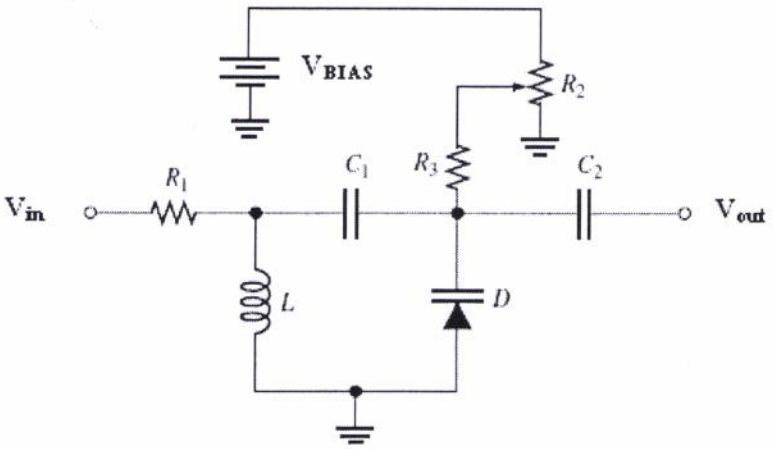


Figure 1(b)

1(b)(i) Given that the capacitance of a Zetex 832A varactor is approximately 40 pF at 0 V bias and that the capacitance at a 2 V reverse bias is 22 pF, determine the capacitance at a reverse bias of 20 V using the specified minimum capacitance ratio.

(ii) Using the capacitances at bias voltages of 0 V and 20 V, calculate the resonant frequencies at the bias extremes for the circuit in Figure 1(b) if L = 2 mH. **(10 Marks)**

2(a) Determine the minimum and the maximum load currents for which the zener diode in Figure2(a) will maintain regulation. What is the minimum value of R_L that can be used? V_Z= 12V, I_{ZK} =1mA, and I_{ZM}= 50mA. Assume an ideal zener diode where Z_Z = 0Ω and V_Z remains a constant 12V over the range of current values, for simplicity. **(10 Marks)**

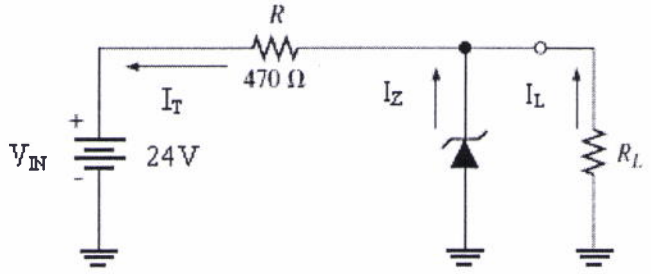


Figure 2(a)

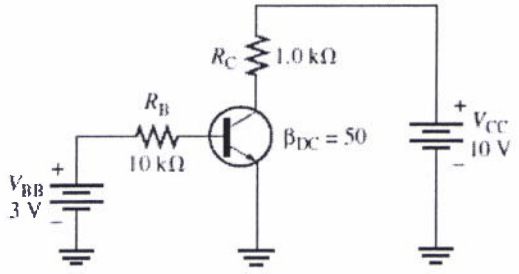


Figure 2(b)

2(b) Determine whether or not the transistor in Figure 2(b) is in saturation. Assume $V_{CE(sat)}$ = 0.2V. **(10 Marks)**

3(a) The LED in Figure 3(a) requires 30 mA to emit a sufficient level of light. Therefore, the collector current should be approximately 30 mA. For the following circuit values, determine the amplitude of the square wave input voltage necessary to make sure that the transistor saturates. Use double the minimum value of base current as a safety margin to ensure saturation. V_{CC} = 9V, $V_{CE(sat)}$ = 0.3 V, R_C = 220 Ω, R_B = 3.3kΩ, β_{DC} = 50, and V_{LED} = 1.6 V.

(10 Marks)

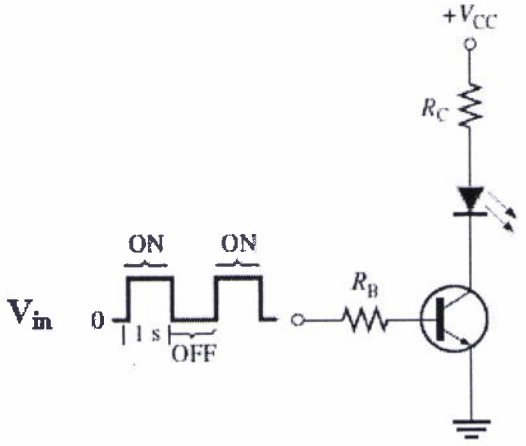


Figure 3(a)

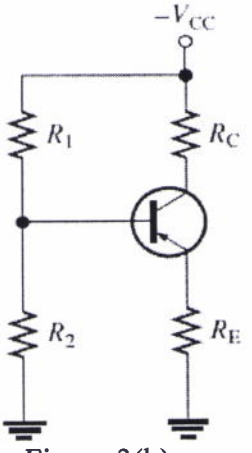


Figure 3(b)

3(b) Find I_C and V_{CE} for a **pnp** transistor circuit with these values: R_1 = 68kΩ, R_2 = 47kΩ, R_C = 1.8kΩ, R_E = 2.2kΩ, V_{CC} = - 6V, and β_{DC} = 75. Refer to Figure 3(b) which shows the schematic with a negative supply voltage. **(10 Marks)**

4(a) Determine how much the Q-point (I_C, V_{CE}) for the circuit in Figure 4(a) will change over a temperature range where β_{DC} increases from 100 to 200. **(10 Marks)**

4(b) Find $R_{in(emitter)}$, A_v, A_i and A_p for the unloaded amplifier in Figure 4(b). **(10 Marks)**

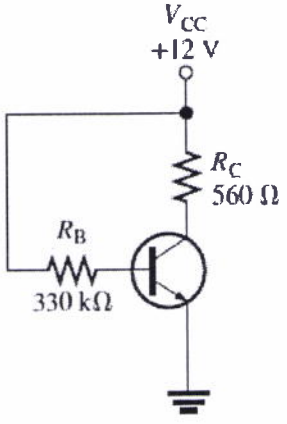


Figure 4(a)

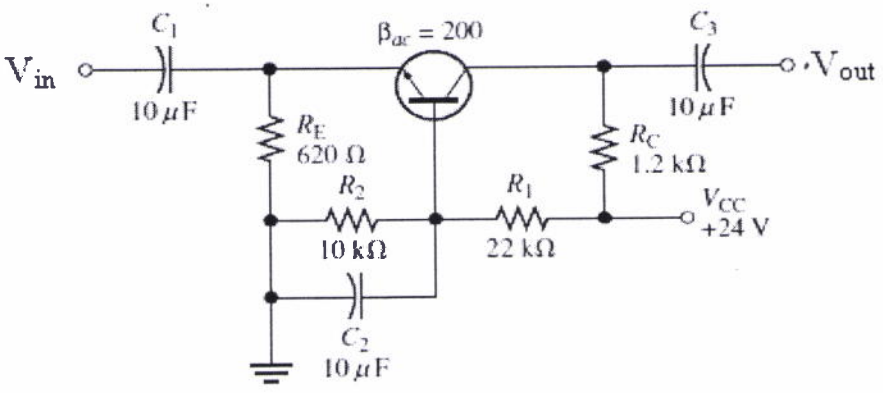


Figure 4(b)

5(a) For the amplifier in Figure 5(a).

(i)Determine the dc collector voltage.

(ii)Determine the ac collector voltage. **(10 Marks)**

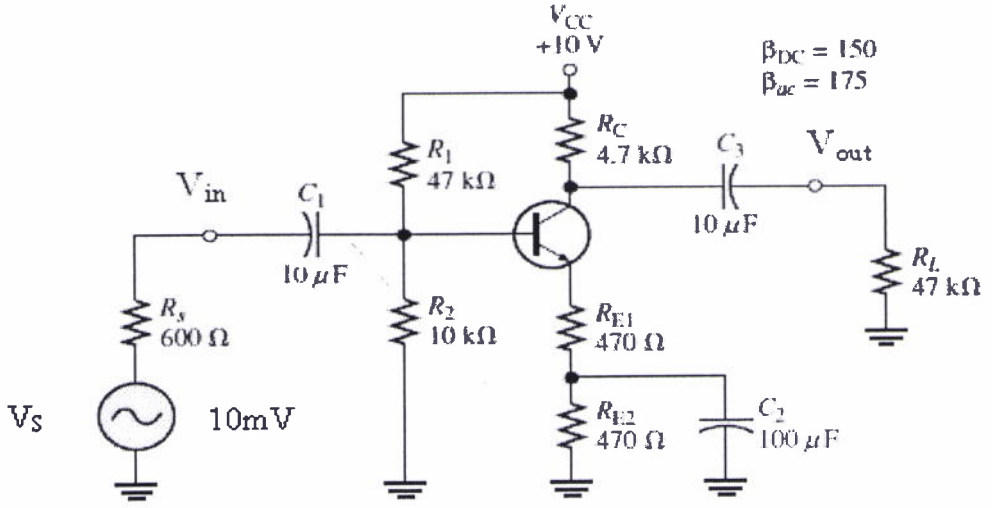


Figure 5(a)

5(b) Determine the voltage gain and the power gain of the class A power amplifier in Figure 5(b). Assume $\beta ac = 200$ for all transistors. **(10 Marks)**

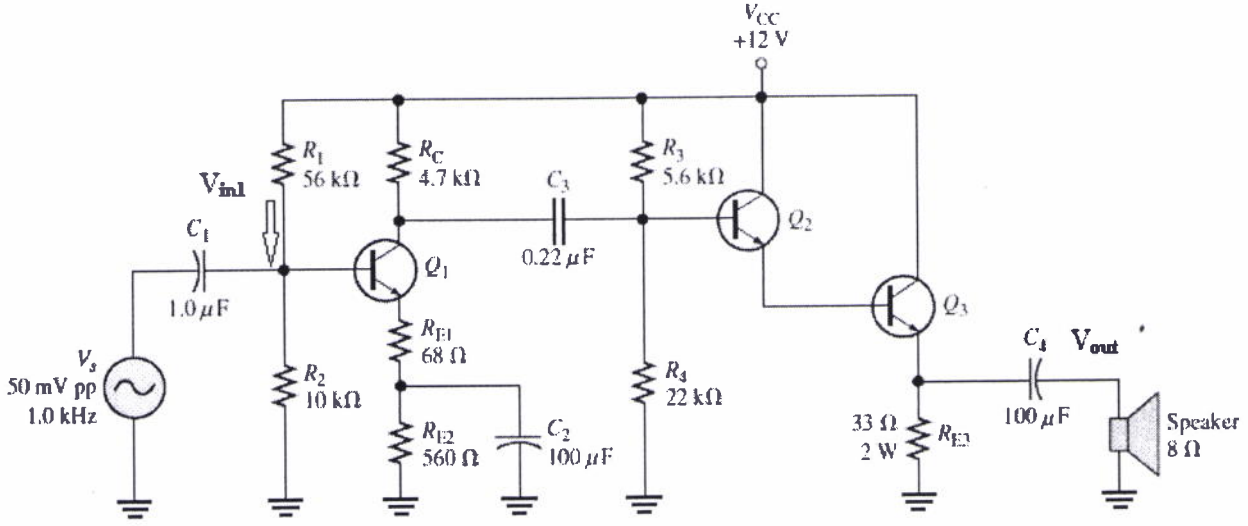


Figure 5(b)

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Tech.)
Mid-Term Examination
Linear Control Systems (CT-305)
March, 2018

Answer All Questions. **Time Allowed: 3 Hours**

1. (a) A unity negative feedback system has a nonlinear function y = f(e) = e^2, as shown in Fig1(a). For an input ***r*** in the range of 0 to 4, calculate and plot the open-loop and close-loop output versus input and show that the feedback system results in a more linear relationship. **(10 Marks)**

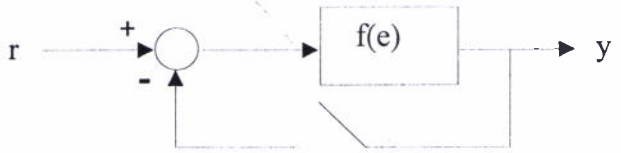


Fig 1(a)

1. (b) (i) Find the step response when y(0) = 1, y′(0) = 0 and r(t) = 1 for t ≥ 0 of the following differential equation.

(ii) What is the steady state response of y (t)? $\frac{d^2y}{dt^2} + 4\frac{dy}{dt} + 3y = 2r(t)$ **(10 Marks)**

2. (a) The rotational velocity ω of the satellite is adjusted by changing the length of the beam L. The transfer function between ω(s) and the incremental change in beam length ΔL(s) is

$$\frac{\omega(s)}{\Delta L(s)} = \frac{2(s+4)}{(s+5)(s+1)^2}$$

The beam length change is ΔL(s) = $\frac{1}{s}$. Determine the response of the rotation ω(t). **(10 Marks)**

2. (b) The dc motor is a power actuator device that delivers energy to a load as shown in Fig 2(a). Field-controlled dc motor uses the field current I_f as the control variable. When a constant armature current I_a is established in a field coil, the motor torque $T_m(t)$ is proportional to $I_f(t)$. The load torque is represented by $T_L(t) = j\Theta''(t) + b\Theta(t)$. V_b, the back electromotive force voltage, is proportional to the motor speed ω(t). Draw the block diagram for this dc motor to control the motor position. Obtain the transfer function Θ(s) / V_f(s) with no disturbance torque.

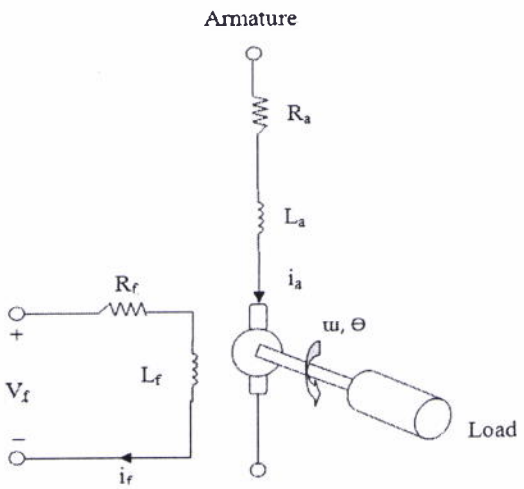


Fig 2(b) **(10 Marks)**

3. (a) Consider the unity feedback system shown in Fig 3(a). The system has two parameters, the controller gain K and the constant K_1 in the process.

(i) Calculate the sensitivity of the closed-loop transfer function to changes in K_1.

(ii) How would you select a value for K to minimize the effects of external disturbances, $T_d(s)$? **(10 Marks)**

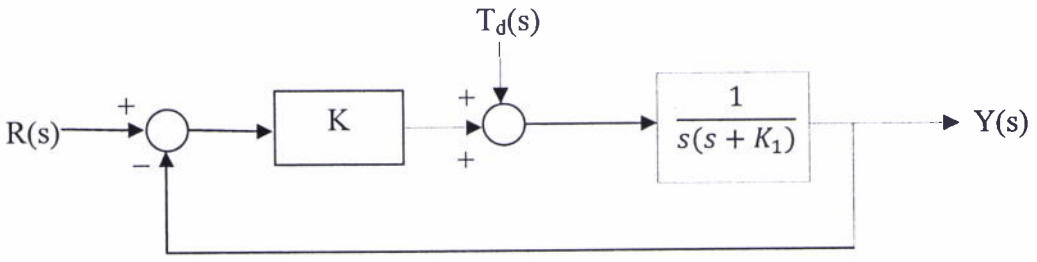


Fig 3(a)

3. (b) In Fig 3(b), consider the closed-loop system with measurement noise N(s), where

$G(s) = \frac{100}{s+100}$, $G_c(s) = K_1$, and $H(s) = \frac{K_2}{s+5}$ **(10 Marks)**

In the following analysis, the tracking error is defined to be E(s) = R(s) – Y(s):

(i) Compute the transfer function T(s) = Y(s) / R(s) and determine the steady-state tracking error due to a unit step response, that is, let $R(s) = \frac{1}{s}$ and assume that N(s) = 0.

(ii) Compute the transfer function Y(s) / N(s) and determine the steady-state tracking error due to a unit step disturbance response, that is, let $N(s) = \frac{1}{s}$ and assume that R(s) = 0.

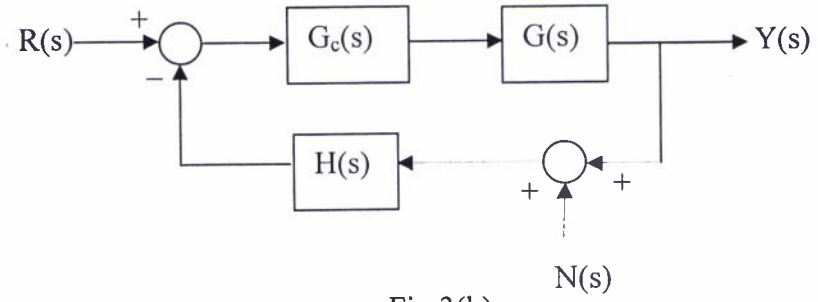


Fig 3(b)

4. (a) A feedback system is shown in Fig 4(a). **(10 Marks)**

(i) Determine the steady-state error for a unit step when K = 0.4 and $G_p(s) = 1$.

(ii) Select an appropriate value for $G_p(s)$ so that the steady-state error is equal to zero for the unit step input.

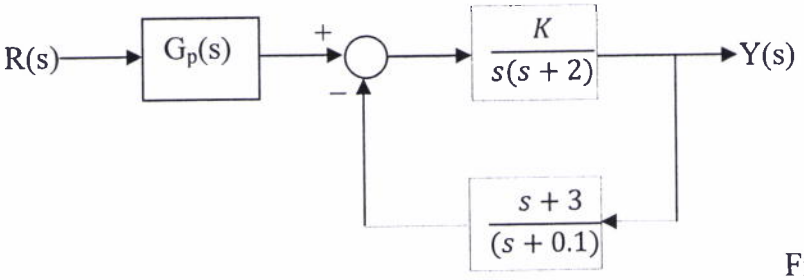


Fig 4(a)

4. (b) For the system with unity feedback shown in Fig 4(b), determine the steady-state error for a step and ramp input when **(10 Marks)**

$$G(s) = \frac{20}{s^2+14s+50}$$

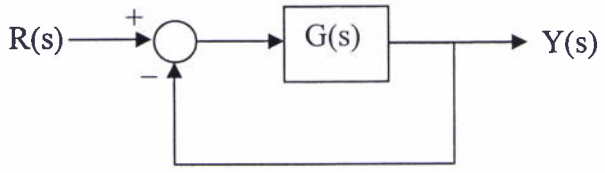


Fig 4(b)

5. (a) Designers have developed small, fast, vertical-take-off fighter aircraft that are invisible to radar (Stealth aircraft). This aircraft concept uses quickly turning jet nozzles to steer the airplane. The control system for the heading or direction control is shown in Fig 5(a). Determine the maximum gain of the system for stable operation.

(10 Marks)

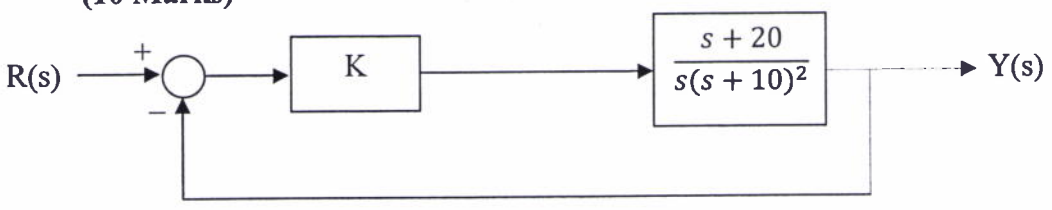


Fig 5(a)

5. (b) A unity negative feedback system has a loop transfer function **(10 Marks)**

$$L(s) = \frac{K}{(s+1)(s+3)(s+6)}$$

Find the value of K when two roots lie on the imaginary axis. Determine the value of the three roots.

**********END**********

Department of Higher Education
University of Computer Studies, Hinthada
Third Year (B.C.Tech.)
Mid-Term Examination
Electrical Circuits II (CT-306)
March, 2018

Answer All Questions. **Time Allowed : 3 hours**

1. (a) At t=0.15 s in the circuit of Figure 1.(a), find the value of (i) i_L; (ii) i_1; (iii) i_2. **(10 marks)**

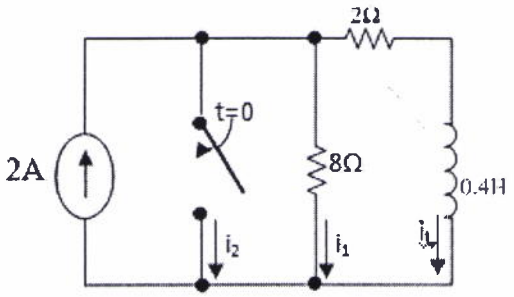


Figure 1.(a)

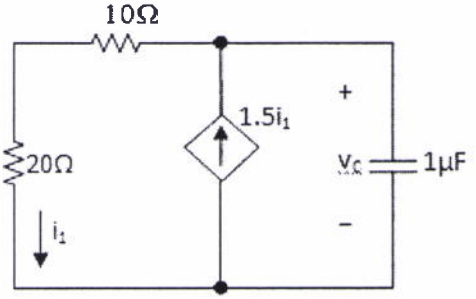


Figure 1.(b)

(b) For the circuit of Figure 1.(b), find the voltage labeled v_C for t > 0 if $v_C(0^-) = 2$ V. **(10 marks)**

2. (a) With reference to the circuit shown in Figure 2.(a),
find (i) α ; (ii) ω_0 ; (iii) $i(0^+)$; (iv) $di/dt|_{t=0^+}$; (v) i(12 ms). **(10 marks)**

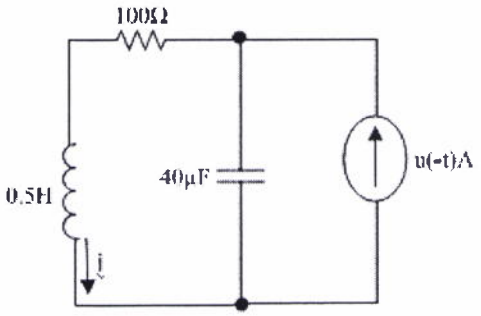


Figure 2.(a)

(b) A parallel RLC circuit contains a 100Ω resistor and has the parameter values $\alpha=1000s^{-1}$ and $\omega_0=800$ rad/s. Find (i)C; (ii)L; (iii)s_1; (iv) s_2. **(10marks)**

3. (a) After being open for a long time, the switch in Figure 3.(a) closes at t = 0.
Find (i) $i_L(0^-)$; (ii) $v_C(0^-)$; (iii) $i_R(0^+)$; (iv) $i_C(0^+)$; (v) $v_C(0.2)$. **(10 marks)**

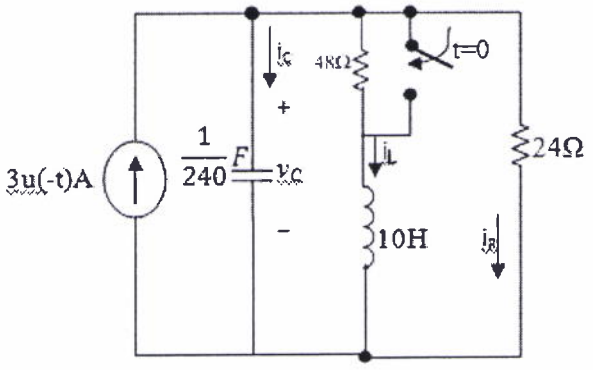


Figure 3.(a)

(b) Determine the ***V(s)*** if v(t) equals (i) $4\delta(t) - 3\ u(t)$; (ii) $4\delta(t-2) - 3t\ u(t)$; (iii)$[u(t)][u(t-2)]$. **(10 marks)**

4. (a) Calculate the voltage ***v(t)*** shown in Figure 4.(a), given an initial current $i(0^-) = 1A$. **(10 marks)**

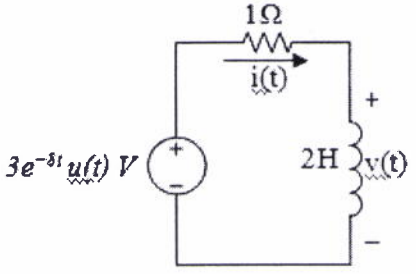


Figure 4.(a)

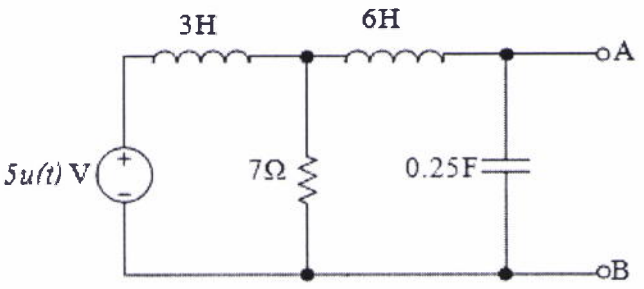


Figure 4.(b)

(b) Using the method of source transformation, reduce the circuit of Figure 4.(b) to a single s-domain current source in parallel with a single impedance. **(10 marks)**

5. (a) A parallel resonant circuit is composed of the elements R = 8k Ω, L = 50m H, and C = 80 nF. Compute (i) ω_0 ; (ii) Q_0; (iii) ω_d ; (iv) α ; (v) ζ. **(10 marks)**

(b) Estimate the location of the two half-power frequencies of the voltage response of a parallel RLC network for which R=40kΩ, L=1H and C=$\frac{1}{64}$μF, and determine the approximate values of the admittance for an operating frequency of 8200 rad/s. **(10marks)**

**********END**********