Total no. of Pages: 1 Roll no. .....

Degree: BTech.. Semester: .....1st .....

MID-SEMESTER EXAMINATION, September 2024

Course Title: Computer Programming

Course Code: .....~~FCCS002~~.....

FCCS0102

Duration: 1:30 Hours Max. Marks: 20

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q.No.	Question	Marks	CO
1a	What are the key features of Python that make it a popular programming language? Provide examples to support your answer.	2	CO1
1b	Write a Python program that takes two numbers as input from the user and prints their sum, difference, product, and quotient.	2	CO2
2a	Write a Python program to print all the numbers between 1 and 100 that are divisible by 3 but not by 5 using a for loop.	2	CO1
2b	Write a Python program to find the first n even numbers using a while loop. The value of n should be provided by the user.	2	CO2
3a	Define a Python function that accepts any number of keyword arguments and prints them in a formatted way.	2	CO3
3b	Write a Python function that calculates the nth Fibonacci number using recursion.	2	CO2
4a	Write a Python program to find the second largest number in a list.	2	CO5
4b	Write a Python program to create a dictionary from two lists: one for keys and one for values. Demonstrate with an example.	2	CO4+CO1
5a	Write the advantages of inheritance. Explain multiple inheritance with the help of an example.	2	CO3
5b	Implement a Python class Circle that inherits from a base class Shape. The Circle class should include a method to calculate the area, using the formula πr^2.	2	CO2

Total number of pages: 1

Roll no.:.....

Degree: B.Tech. Semester:I Course work
MID-SEMESTER EXAMINATION, September 2024

Course code: FCMT0101

Course title: Mathematics I

Time: 1 hour 30 min.

Maximum Marks. 20

Note: Attempt all questions in the given order only. Missing data/information (if any), may be suitably assumed and mentioned in the answer.

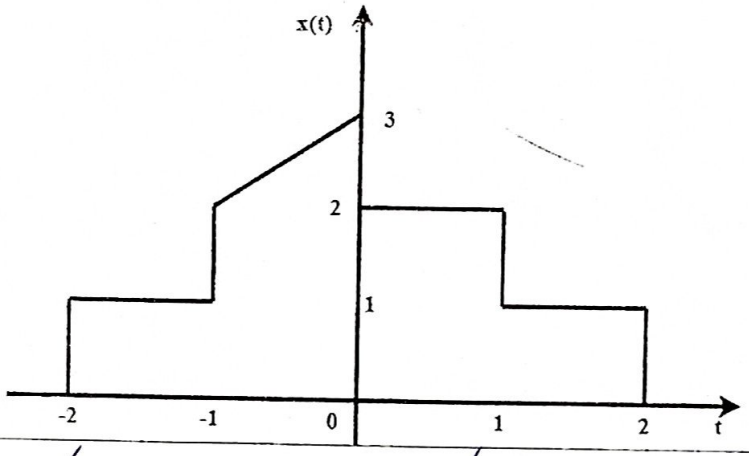
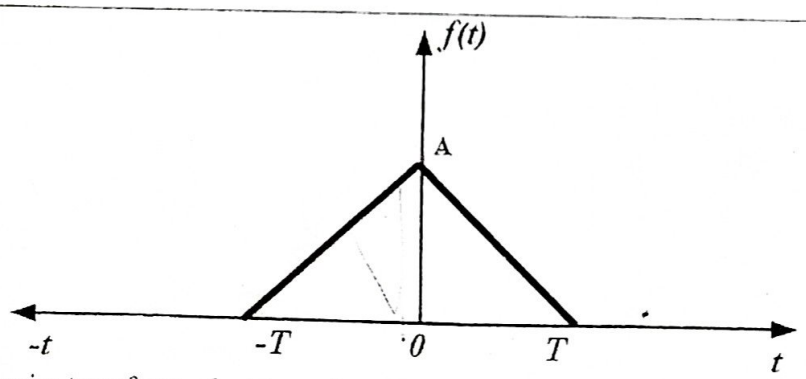
Q. No.	Question	Marks	CO
1a	If $\tan(\theta + i\phi) = \cos\alpha + i\sin\alpha$, then show that $$\phi = \frac{1}{2}\log\tan(\frac{\pi}{4} + \frac{\alpha}{2}).$$	2	CO1
1b	If $\sin(\theta + i\phi) = \tan\alpha + i\sec\alpha$, then show that $\cos 2\theta \cosh 2\phi = 3$.	2	CO1
2a	If $y = \frac{1}{1-5x+6x^2}$, then find the n^{th} derivative of y.	2	CO1
2b	If $y = e^{\tan^{-1}x}$, then prove that $(1+x^2)y_{n+2} + (2(n+1)x - 1)y_{n+1} + n(n+1)y_n = 0$.	2	CO1
3a	Obtain by Maclaurin's theorem the first three terms in the expansion of the function $e^{\sin x}$.	2	CO1
3b	If $u = \tan^{-1}\left(\frac{y}{x}\right)$, then find the value of $u_{xx} + u_{yy}$.	2	CO2
4a	If $z = \log\left(\frac{x^3+y^3}{x+y}\right)$, then show that $x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} = 2$.	2	CO2
4b	If $x + y + z = u$, $y + z = uv$, $z = uvw$, then show that $$\frac{\partial(x,y,z)}{\partial(u,v,w)} = u^2 v.$$	2	CO2
4c	If $u = f(2x - 3y, 3y - 4z, 4z - 2x)$, then prove that $$\frac{1}{2}u_x + \frac{1}{3}u_y + \frac{1}{4}u_z = 0.$$	2	CO2
4b	Find the series expansion of the function $e^x \log(1+y)$ about the point $(0,0)$ upto second degree terms.	2	CO2

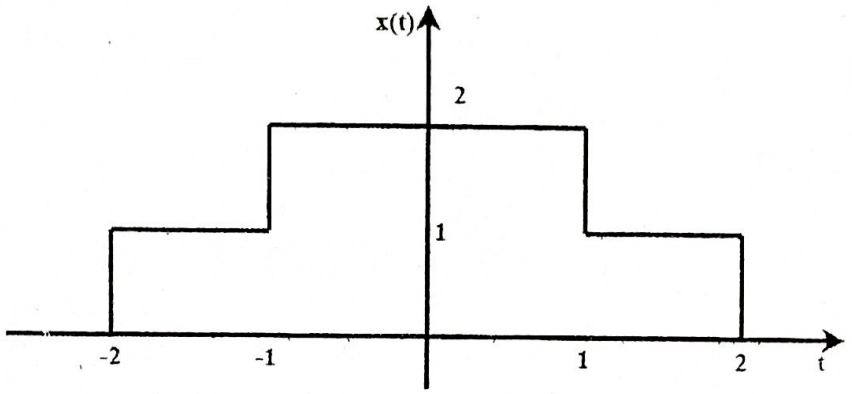
Total No. of Pages: 2 Roll No.

Degree: B.Tech, Semester: I
MID-SEMESTER EXAMINATION, SEPTEMBER 2024

Course Code- **FCEC0106**
Course Title- **Basics of Electronics & Communication Engineering**
Time: 01:30 Hrs Max Marks: 20

Note: Attempt all five questions. Missing data/information (if any) may be suitably assumed and mentioned in the answer.

Q. No.	Questions	Marks	CO
Q-1	For the continuous time signal x(t) shown in figure below 		
1 a	Draw the signal (a) $4x\left(\frac{5}{3}t-2\right)$ (b) $x(-3t+5)$	2	CO-1
1 b	Explain the unit step, impulse and ramp signal with proper mathematical expression and plots. Write the mathematical expression of the signal given in **Que-1** in terms of only unit step and ramp signal.	2	CO-1
Q-2			
2 a	 Find the Fourier transform of a triangular pulse of duration 2T and amplitude A as shown in figure.	2	CO-1
2 b	Determine whether the given signal is periodic or not. If periodic, determine the fundamental time period. $$y(t)=\left(\sin\frac{3\pi t}{2}\ \sin\frac{\pi t}{2}\right)+\left(\sin\frac{9\pi t}{2}\right)$$	2	CO-1

Q-3			
3 a	Find the Fourier transform of signal shown in Figure 	2	CO-1
3 b	Write the difference between FM and PM. What are the advantages of FM over AM?	2	CO-2
Q-4			
4 a	Why modulation is necessary? Explain the advantage of modulation in detail.	2	CO-2
4 b	A modulating signal $m(t)=10\cos(2\pi\times10^3\ t)$ is amplitude modulated with a carrier signal $c(t)=50\cos(2\pi\times10^5\ t)$. Find the modulation index, the carrier power, and the power required for transmitting the AM wave.	2	CO-2
Q-5			
5 a	Explain the square law modulation method for AM generation with proper block diagram and expressions.	2	CO-2
5 b	A SSB transmission contains 10kW. This transmission is to be replaced by a standard amplitude modulated signal with the same power content. Determine the power content of the carrier and each of the sidebands when the percent modulation is 80%.	2	CO-2

Total no. of Pages: **01** Roll no. .....

Degree: **B.Tech**, Semester: **Ist**

MID-SEMESTER EXAMINATION, September 2024

Course Title: **Quantum Physics**

Course Code: **FCPH0114**

Duration: **1:30 Hours** Max. Marks: **20**

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO
1a	What are the salient features of black body radiation? Explain the energy distribution in the spectrum of a black body.	2	1
1b	Work function of sodium is 2.3 eV. Obtain the maximum wavelength which will cause emission of photoelectrons from the material.	2	1
2a	What is Compton effect? Explain, how wave theory of light failed to explain Compton effect?	2	1
2b	In a photoelectric effect, explain how a change in intensity and frequency affects the number of photoelectrons and the kinetic energies of these electrons, on the basis of Einstein's theory.	2	1
3a	How is the wave nature of electron demonstrated experimentally? Explain with the help of an experiment.	2	2
3b	An electron beam is accelerated from rest through a potential difference of 100 V. Calculate the associated wavelength.	2	2
4a	Explain Heisenberg uncertainty principle. Based on this, show the non-existence of electrons inside the nucleus.	2	3
4b	An electron in confined to a potential well of width 20 nm. Calculate the minimum uncertainty in its velocity.	2	3
5a	Derive a relationship between group and phase velocity of matter waves.	2	2
5b	Discuss the Planck's law of radiation in terms of wavelength.	2	2

Total no. of Pages: ..... Roll no. .....

Degree: B.TECH. Semester: FIRST

END-SEMESTER EXAMINATION, APRIL-MAY, 2024

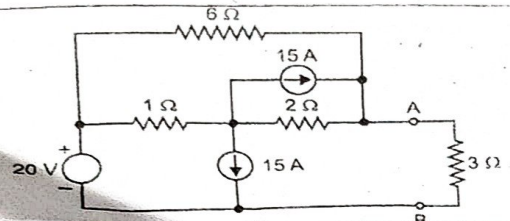
Course Title: FCEE0106: Fundamentals of Electrical Engineering

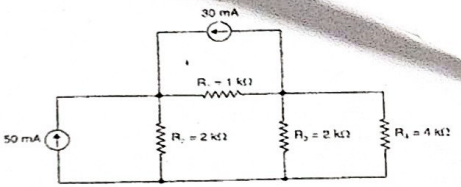
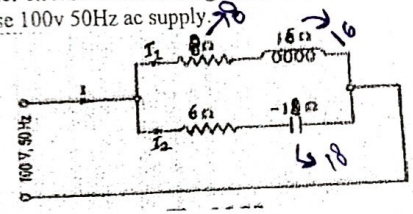
Course Code: FCEE0106

Duration: 1.5 Hours **Max. Marks: 20 M**

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO
1a	Define accuracy, precision, relative accuracy of a measurement.	2M	CO1
1b	Suppose you are measuring the area of a rectangle, where: The length (L) is measured as 10.0±0.2 cm The width (W) is measured as 5.0±0.1 cm i. Calculate the Nominal Value of the Area ii. Determine the Absolute Error in the Area iii. Determine the Relative Error in the Area.	2M	CO1
2a	Describe the following in case of measuring instruments. i. Deflecting torque ii. Controlling torque iii. Damping torque	2M	CO1
2b	The change of inductance for a moving iron ammeter is $2\mu H$/degree. The control spring constant is $5*10^{-7}$ N-m/degree. The maximum deflection of the pointer is 100^0, what is the current corresponding to maximum deflection?	2M	CO1
3a	State maximum power transfer theorem and also prove the condition when the maximum power is transferred in a circuit.	2M	CO2
3b	Using Thevenin's theorem, find the voltage across 3Ω resistor as shown in fig below.	2M	CO2



4a	Use nodal analysis to find current in the 4 kΩ resistor shown in Fig  	2M	CO2
4b	A tuned circuit consisting of a coil having an inductance of 200 μH and a resistance of 20 Ω is in parallel with a variable capacitor. This combination is in series with a resistor of 8000 Ω. The entire circuit is connected to a 230 V, 1MHz supply. Calculate (i) the value of C to give resonance (ii) the dynamic impedance and Q-factor of the tuned circuit and (iii) the current in each branch.	2M	CO2
5a	The parallel circuit shown in diagram is connected across a single phase 100v 50Hz ac supply.  Calculate i. The total current ii. The supply power factor iii. Active and reactive power supplied	2M	CO2
5b	Derive the torque equation for moving iron instrument	2M	CO1