# Hall Ticket Number :

#### Code: 7GC32

II B.Tech. I Semester Supplementary Examinations February 2022

## Engineering Mathematics-III

(Common to All Branches)

Max. Marks: 70





- 1. a) Apply fourth order Runge-Kutta method to  $\frac{dy}{dx} = 3x + \frac{1}{2}y$ , y(0) = 1 determine y(0.1) correct to four decimal places.
  - b) Find a real root of the equation  $3x = \cos x + 1$  by Newton-Raphson's method correct to four decimal places. 7M

### OR

2. Find a real root of the equation  $3x = \cos x + 1$  by Newton-Raphson's method correct to four decimal places.

3. a) Using Newton's forward interpolation formula and the given table of values

Х	1.1	1.3	1.5	1.7	1.9
F(x)	0.21	0.69	1.25	1.89	2.61
	41 1			4.0	

Obtain the value of f(x) when x = 1.2

b) Find the first and second derivatives of the function tabulated below at the point x = 1.5

Х	1.5	2.0	2.5	3.0	3.5	4.0				
У	3.375	7.0	13.625	24.0	38.875	59.0				
OR										

7M

14M

4. The following table of values of x and y is given.

x	0	1	2	3	4	5	6
У	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find 
$$\frac{dy}{dx}$$
 and  $\frac{d^2y}{dx^2}$  at x=6

UNIT-III

5. Form the partial differential equation by eliminating the arbitrary constants  $x^2 + y^2 + (z-c)^2 = a^2$  14M

7M

Time: 3 Hours

**R-17** 



7M

6. a) Form a partial differential equation by eliminating the arbitrary functions from z = f(x+at) + g(x-at). 7M

b) Solve 
$$(x^2 - yz)p + (y^2 - zx)q = (z^2 - xy)$$
 7M

# **UNIT-IV** 7. a) Find the Fourier series to represent f(x) = f x in $0 \le x \le 2$ 7M

b) Find the half range cosine series for the function  $f(t) = t - t^2$ , in 0 < t < 1 7M

#### OR

8. a) Find the Fourier series to represent f(x) = |x| when -f < x < f and deduce that  $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}$  7M

b) Find the half range cosine series for the function f(x) = x, when

$$0 < x < f_{\text{hence show that } \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots = \frac{f^2}{8}}$$
**UNIT-V**

9. a) Find the Fourier cosine transform of  $f(x) = e^{-ax} (x > 0, a > 0)$ . 7M

- b) Find the Fourier transform of f(x) given by  $f(x) = \begin{cases} 1, for |x| < 1 \\ 0, for |x| > 1 \end{cases}$  hence evaluate  $\int_{0}^{\infty} \frac{\sin x}{x} dx$ OR OR 7M
- 10. Find the finite Fourier sine and cosine transforms of f(x) defined by

$$f(x) = \begin{cases} 1, 0 < x < \frac{f}{2} \\ -1, \frac{f}{2} < x < f \end{cases}$$
14M

		II Ticket Number : R-17	
(	Co	de: 7G333	
		II B.Tech. I Semester Supplementary Examinations February 2022	
		Signals and Systems	
		(Electronics and Communication Engineering)	
		ax. Marks: 70 swer any five full questions by choosing one question from each unit (5x14 = 70 Marks )	
	7 \		
			Ν
	-)	UNIT-I	7
8	1)	Define Fourier series of signal f(t) .Derive the Relationship between various types of Fourier series representation	7
k	<b>)</b> )	Differentiate clearly between the even, odd and half wave symmetry waveforms with respect	7
	- /	to their Fourier coefficients (use appropriate waveform) in their Fourier series representation	
		OR	
8	a)	Write the Classification of systems based on certain properties.	7
k	)	Determine whether the following signals are energy signals or power signals and calculate their energy or power	7
		i) $x(n) = (\frac{1}{2})^n u(n)$ ii) $x(t) = \cos^2 \check{S}_0 t$	
a	a)	State and prove Differentiation and integration properties of Fourier Transform.	7
	-) ))	What is the Significance of Hilbert Transform? Explain	7
~	-)	OR	•
a	a)	Find the Fourier transform of DC Signal	7
	)	State and prove Time Convolution property of Fourier Transform.	7
	,		
a	a)	Prove that bandwidth and rise time of an LTI system are inversely proportional to each other.	7
	) )	Discuss the conditions for distortionless transmission.	7
	,	OR	
a	a)	The output response of a continuous time LTI system is $2e^{-3t}u(t)$ when the input x(t) is u(t)	7
		find the Transfer function.	
k	<b>)</b>	Determine whether the following systems are Linear or Nonlinear, Shift variant or Invariant,	7
		Causal or Non-causal, Stable or unstable. (i) $y(t) = x(t+10) + x^2(t)$ (ii) $dy(t)/dt + 10 y(t) = x(t)$	
		UNIT-IV	
8	,	Derive the relation between PSDs of input and output for an LTI system	7
k	)	State and prove any four properties of Cross correlation function	7
		OR	
a	,	State and explain Parseval's theorem.	7
t	)	Explain about the properties of LTI system	7
			_
8	,	Find the Laplace transform of the signal $x(t) = e^{-at} u(t) + e^{-bt} u(t)$	7
k	)	Explain the Concept of region of convergence (ROC) for Laplace transforms	7
		OR	
	•	Prove the differentiation property of Z-transform. Explain the concept of ROC in Z transform	7
. 8	a) 5)	Give the relationship between z-transform ,Fourier transform and Laplace Transform	7

	Ha	all Ticket Number :	٦
	Co	de: 7G332	
		II B.Tech. I Semester Supplementary Examinations February 2022	
		Digital Design	
		(Electronics and Communication Engineering)	
		Time: 3 Hours nswer any five full questions by choosing one question from each unit (5x14 = 70 Marks )	
		******	
			Marks
1	2)	UNIT-I	1014
١.	a) b)	Write a short note on logic gates and their truth tables List out the properties of XOR gate	10M 4M
	5)	OR	
2.	a)	Represent +25,-25 and -52 in 1's and 2's compliment forms	7M
	b)	State and prove the De-Morgan's theorems	7M
		UNIT–II	
3.	a)	What is meant by Don't care combinations and simplify the given Boolean function (F) together with the Don't cares (d) $F(x,y,z) = (0,1,2,4,5) \cdot d(2,7)$	714
		together with the Don't cares (d) $F(x,y,z) = (0,1,2,4,5)+d(3,7)$	7M
	b)	Simplify the given Boolean function and realize using NOR gates.	
		F(a,b,c,d) = (1,3,5,7,9,11,13)	7M
		OR	
4.	a)	Define prime implicants, essential prime implicants and selective implicants	8M
	b)	Differences between canonical and standard form of Boolean functions UNIT-III	6M
5.	a)	Implement given function using 8X1 multiplexer $F=(0,1,5,6,7)$	7M
	b)	Design a circuit which convert given 4-bit gray code to binary code	7M
		OR	
6.		Implement given functions using PAL	14M
		F1(a,b,c)=(1,2,3,4) $F2(a,b,c)=(1,3,5,7)$ $F3(a,b,c)=(0,5,6,7)$	
7	a)	UNIT-IV Compare synchronous and asynchronous circuits	6M
	b)	Define excitation table, state table and state diagram	8M
	,	OR	
8.	a)	With a neat diagram explain operation of 4-bit UP/DOWN counter	10M
	b)	Explain various triggering methods	4M
9.	a)	List out the salient features of the ASM chart	8M
	b)	Draw the ASM chart for MOD-3 counter OR	6M
10.		Determine a minimal state table equivalent to the given state table using partition	
10.		technique method	

technique method

PS	NS,Z					
Рð	X=0	X=1				
1	1,0	1,0				
2	1,1	4,1				
3	4,0	5,0				
4	1,1	5,0				
5	2,0	3,0				
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14M

Hall Ticket Number :							
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#### Code: 7G234

II B.Tech. I Semester Supplementary Examinations February 2022

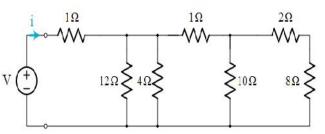
### **Electrical Circuits and Technology**

(Electronics and Communication Engineering)

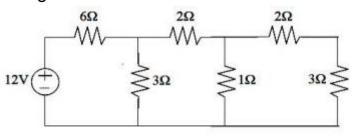
Max. Marks: 70 Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)



1. a) Determine the current i in the network shown in the figure below:



b) Determine the loop currents using Mesh Analysis and also the branch voltages



OR

- 2. a) Explain Current & Voltage Division Rules with examples.
  - b) Determine the current supplied by the voltage source when the circuit shown below is excited by 20V across the terminal AB.



- 3. a) Define Resonant frequency, Band Width & Q-Factor 6M
  b) An RLC circuit has R=1 K , L=100 mH and C=10 pF. If a voltage of
  - 100 V is applied across the series combination, determine (i) resonant frequency (ii) Q factor and (iii) half power frequencies 8M

7M

7M

8M

4.	a)	Find the power delivered and current from a sinusoidal voltage source with V=220 V to an impedance of $Z=(6+j8)$ .	6M
	b)	Explain about different Types of Wave Forms and also Importance of	0111
	2)	Sinusoidal Wave Form.	8M
		UNIT-III	
5.		Explain with defining equations about (i) y-parameters; (ii) z-	
		parameters; (iii) ABCD-parameters; (iv) h-parameters.	14M
		OR	
6.	a)	What are the transmission parameters? Deduce the relation A <sup>2</sup> -BC=1 for a symmetrical and reciprocal four terminal network.	7M
	b)	The z parameters of a symmetrical four terminal network are $z_{11}=z_{22}=20$ and $z_{12}=z_{21}=5$ . Find the ABCD parameters of the	
		network	7M
		UNIT-IV	
7.	a)	Describe the principle of operation of a dc generator?	7M
	b)	A 2 pole lap wound generator has 200 conductors on armature. It is	
		driven by prime mover at a constant speed of 600 rpm. If the flux per	
		pole is 0.1 Wb, calculate the generated emf.	7M
		OR	
8.	a)	Explain the speed-torque characteristics of dc shunt and dc series motors	8M
	b)	Explain the various losses which take place in a dc machine.	6M
		UNIT-V	
9.	a)	Explain in detail the construction of a 3-phase induction motor	
-	- /	specifying in detail the squirrel cage and slip ring motor construction.	10M
	b)	Write the principle of Induction motor.	4M
		OR	
10.	a)	Explain with the help of suitable diagram how the rotating magnetic	
		field is produced in a three phase motor?	10M
	b)	What is the relationship between the supply frequency number of	
		poles and synchronous speed?	4M
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