Paper Code:

Reg. No.:_____

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Faculty of Science & Humanities
MATLAB Model Question Paper-B.Tech.

Department/Faculty : **Mathematics/FSH**

Programme : **B. Tech (All Branches)**

Semester/Batch : **III**

Date of Examination : **December**

Course Code : **BSC207A**

Course Title : **Engineering Mathematics - 3**

SEE Model Question paper

MATLAB

INSTRUCTIONS TO STUDENTS:

1. Answer all questions.
2. Use only SI units.
3. Use of non-programmable scientific calculator is permitted.
4. Use of data handbook permitted wherever applicable.
5. Missing data may be appropriately assumed.
6. Indicate the question numbers clearly against your answers.

Maximum Duration: 2 Hour **Maximum Marks: 50**

IMPORTANT:
You may take this question paper away at the end of the examination. Please keep it in a safe place for future reference

Question No. 1 **(3+3+4=10 marks)**

a. Find the Laplace transform of the function using built-in MATLAB function

$$f(t) = \begin{cases} e^{3t} & 0 \le t \le 3 \\ e^{-3t} & t > 3 \end{cases}$$

b. Find the Fourier transform of the function using built-in MATLAB function

$$f(t) = \begin{cases} 4 & |t| \le 2 \\ 0 & |t| > 2 \end{cases}$$

c. Plot the vector field in the given interval $-1 \le x \le 1, -1 \le y \le 1, -1 \le z \le 1$

$$\boldsymbol{F} = (y)\hat{\boldsymbol{\imath}} + (x)\hat{\boldsymbol{\jmath}} + (x - 2y + z)\hat{\boldsymbol{k}}$$

Question No. 2 **(5+5=10 marks)**

a. Plot the periodic function in the interval $[-4\pi, 4\pi]$

$$f(x) = \begin{cases} 2\,sin\,x & 0 \le x < \pi \\ 0 & \pi \le x \le 2\pi \end{cases}, f(x + 2\pi) = f(x)$$

b. Plot the periodic function in the interval $[-16,16]$

$$f(x) = \begin{cases} x^2/4 & 0 \le x < 4 \\ 4 & 4 \le x < 6 \\ 0 & 6 \le x \le 8 \end{cases}, \quad f(x + 8) = f(x)$$

Question No. 3 (Manual calculation) **(10 marks)**

Obtain a Fourier series expansion of the given periodic function which is defined in the interval $-\pi < x < \pi$

$$f(x) = x^2, f(x + 2\pi) = f(x)$$

Question No. 4 **(7+3=10 marks)**

In a machine the displacement of y of a given point is given for a certain angle θ as follows:

$\boldsymbol{\theta^o}$	30	60	90	120	150	180	210	240	270	300	330	360
$\boldsymbol{y}$	2.34	3.01	3.68	4.15	3.69	2.20	0.83	0.51	0.88	1.09	1.19	1.64

a. Write a MATLAB function for the Fourier series expansion up to third harmonic using Harmonic analysis method.

b. Plot the data point and the Fourier series expansion in the same graph.

Question No.5: **(7+3=10 marks)**

For the given periodic function

$$f(x) = \begin{cases} -x & -\pi \le x < 0 \\ 0 & 0 \le x \le \pi \end{cases} \quad , f(x + 2\pi) = f(x)$$

a. Write a MATLAB function for the complex form of Fourier series expansion of the given periodic function for $N = 5$.
b. Plot the complex form of Fourier series expansion and the periodic function in the interval $[-3\pi, 3\pi]$ for $N = 5$ in the same graph.

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