AIKTC KALSEKAR TECHNICAL CAMPUS
INNOVATIVE TEACHING EXCELLENT LEARNING

Knowledge Resource & Relay Centre (KRRC)

**AIKTC/KRRC/SoET/ACKN/QUES/2~~018-19~~19-20/** **Date:** 15/01/2020

**School:** SoET-CBSGS **Branch:** COMP. ENGG. **SEM:** III

**To,**
**Exam Controller,**
**AIKTC, New Panvel.**

Dear Sir/Madam,

Received with thanks the following **Semester/~~Unit Test-I/Unit Test-II~~ (Reg./ATKT)** question papers from your exam cell:

| Sr. No. | Subject Name | Subject Code | Format | | No. of Copies |
|---|---|---|---|---|---|
| | | | SC | HC | |
| 1 | Applied Mathematics- III | CSC301 | | ✓ | 02 |
| 2 | Object Oriented Programming Methodology | CSC302 | | – | – |
| 3 | Data Structures | CSC303 | | – | – |
| 4 | Digital Logic Design & Analysis | CSC304 | | – | – |
| 5 | Discrete Structures | CSC305 | | – | – |
| 6 | Electronic Circuits & Communication Fundamental | CSC306 | | ✓ | 02 |
| | | | | | |
| | | | | | |

**Note: SC – Softcopy, HC - Hardcopy**

(Shaheen Ansari)
**Librarian, AIKTC**

**Time Duration: 3Hr** **Total Marks: 80**

N.B.:1) Question no.1 is compulsory.
2) Attempt any three questions from Q.2to Q.6.
3) Figures to the right indicate full marks.

**Q1. a)** Find the Laplace transform of $e^{-4t}t\sin 3t$. **[5]**

**b)** Find the half-range cosine series for $f(x) = x,\ 0 < x < 2$. **[5]**

**c)** Find $\nabla.\left(r\,\nabla\frac{1}{r^3}\right)$. **[5]**

**d)** Show that the function $f(z) = \sin z$ is analytic and find $f'(z)$ in terms of z. **[5]**

**Q2. a)** Find the inverse Z-transform of $F(z) = \frac{1}{(z-5)^3}$, $|z| < 5$. **[6]**

**b)** Find the analytic function whose imaginary part is $e^{-x}(y\sin y + x\cos y)$. **[6]**

**c)** Obtain Fourier series for the function $f(x) = x + x^2$, $-\pi \le x \le \pi$ and $f(x + 2\pi) = f(x)$. **[8]**

Hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \cdots$ and $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \cdots$

**Q3. a)** Find $L^{-1}\left[\frac{1}{(s-a)(s-b)}\right]$ using convolution theorem. **[6]**

**b)** Is S= $\left\{\sin\left(\frac{\pi x}{4}\right), \sin\left(\frac{3\pi x}{4}\right), \sin\left(\frac{5\pi x}{4}\right), \ldots\ldots\right\}$ orthogonal in $(0, 1)$? **[6]**

**c)** Using Green's theorem in the plane evaluate $\int_c (xy + y^2)dx + (x^2)dy$ where C is the closed curve of the region bounded by $y = x$ *and* $y = x^2$. **[8]**

**Q4. a)** Find Laplace transform of $f(t) = \begin{cases} \sin 2t & ,o < t \le \frac{\pi}{2} \\ 0 & ,\frac{\pi}{2} < t < \pi \end{cases}$ and $f(t) = f(t + \pi)$. **[6]**

**b)** Prove that a vector field $\bar{f}$ is irrotational and hence find its scalar potential $\bar{f} = (x^2 + xy^2)\,i + (y^2 + x^2y)j$. **[6]**

**c)** Find the Fourier expansion for $f(x) = \sqrt{1 - \cos x}$ in $(0, 2\pi)$. Hence deduce that $\frac{1}{2} = \sum_1^\infty \frac{1}{4n^2-1}$. **[8]**

**Q5.a)** Use Gauss's Divergence Theorem to show that $\iint_S \nabla r^2 \overline{ds} = 6V$ where S is any closed surface enclosing a volume V. **[6]**

**b)** Find the Z-transform of $f(k) = b^k$, k< 0. **[6]**

**c)** i) Find $L^{-1}\left[\frac{s}{(s-2)^6}\right]$. **[8]**

ii) Find $L^{-1}\left[\log\left(1 + \frac{a^2}{s^2}\right)\right]$.

**Q6.a)** Solve using Laplace transform **[6]**
$(D^2 + 9)y = 18t$, given that $y(0) = 0$ and $y\left(\frac{\pi}{2}\right) = 0$

**b)** Find the bilinear transformation which maps the points Z=∞, i, 0 onto W=0, i, ∞. **[6]**

**c)** Find Fourier integral representation of $f(x) = e^{-|x|}$ $-\infty < x < \infty$. **[8]**

18/4/19

**Paper / Subject Code: 49302 / ELECTRONIC CIRCUITS AND COMMUNATION FUNDAMENTALS**

SE-Sem-III-COMPS-CBSGS

**(3 Hours)** **[Total Marks : 80]**

N.B. : 1. Question **One** is **Compulsory.**
2. Solve any **Three** out of remaining.
3. **Draw** neat and **clear** diagrams.
4. Assume suitable **data** if required

Q.1. Attempt the following

a) Draw and explain block diagram of op-amp 5
b) Compare BJT and FET 5
c) Justify that JFET can be used as voltage variable resistor 5
d) What are the drawbacks in Delta Modulation? How to overcome them? 5

Q.2. A. Explain Balanced modulator for DSB signal. 10

B. Explain block diagram of PLL. 10

Q.3. A. Explain op-amp as inverting and non-inverting Amplifier. 10

B. Write short note on generation of FM by Armstrong method. 10

Q.4. A. What is modulation index for AM and FM. An AM signal has a total power of 48 Watts with 45% modulation. Calculate the power in the carrier and the sidebands. 10

B. Explain Super-heterodyne receiver along with waveforms for each stage. 10

Q.5. A. What is multiplexing in Communication system? Explain TDM in detail. 10

B. Explain generation of PAM. 10

Q.6 . Write Short note (any two) 20
a) Zero Crossing Detector
b) Construction of n channel FET.
c) Characteristics of op-amp.

**********