

Code: 5GC41

II B.Tech. II Semester Supplementary Examinations August 2021

Complex Variables and Special Functions

(Common to EEE & ECE)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I1. a) Symmetry of Beta function $B(m, n)=B(n, m)$ 7Mb) Evaluate $\int_0^1 \frac{x^2}{\sqrt{1-x^5}} dx$ in terms of B function 7M**OR**2. a) Find real and imaginary parts $\cot z$ 7Mb) Find all the roots of $\sin z = 2$ 7M**UNIT-II**3. Determine P such that the function $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{px}{y} \right)$ be an analytic function 14M**OR**4. Find an analytic function whose real part is $e^{-x} [x \sin y - y \cos y]$ 14M**UNIT-III**5. Evaluate $\int_c (y^2 + 2xy) dx + (x^2 - 2xy) dy$ where c is the boundary of the region by $y = x^2$ and $x = y^2$ 14M**OR**6. Expand $\log z$ by Taylor's series about $z=1$. 14M**UNIT-IV**7. a) Find the poles and Residues at each pole $\frac{ze^z}{(z-1)^3}$ 7Mb) Use Residue theorem to find the number of zeros of the polynomial $z^{10} - 6z^7 + 3z^3 + 1$ if $|z| < 1$ 7M**OR**8. Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)} dz$ where c is the circle $|z| = 3$ 14M**UNIT-V**9. Find the bilinear Transformation which maps the point $(-1, 0, 1)$ into the points $(0, i, 3i)$. 14M**OR**10. Find the image of the region in the z -plane between the lines $y=0$ and $y = \frac{f}{2}$ under the Transformation $w = e^z$. 14M

Code: 5G344

II B.Tech. II Semester Supplementary Examinations August 2021

Field Theory and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) Define co-ordinate system? Explain different types of co-ordinate systems. 10M
 b) Write a short note on following: i) Stoke's theorem ii) Divergence theorem. 4M

OR

2. a) Define Electric potential? Derive the expression for Electric potential. 7M
 b) Determine the Divergence and curl vector field as $T=10r \sin^2 \theta \cos \phi$. 7M

UNIT-II

3. a) Write and explain different kinds of current density's with suitable diagrams and expressions. 7M
 b) In a cylindrical conductor of radius 2mm, the current density varies with distance from the axis according to $J= 10^3 e^{-400r} \text{A/m}^2$. Find the total current I. 7M

OR

4. a) Derive the expressions for resistance of conductor with uniform cross section 7M
 b) If $J=1/r^3 (2\cos \theta \mathbf{a}_r + \sin \theta \mathbf{a}_\theta)$ A/m², calculate the current passing through
 i) A hemispherical shell of radius 20cm, $0 < \theta < \pi/2$, $0 < \phi < 2\pi$
 ii) A spherical shell of radius 10cm 7M

UNIT-III

5. a) Derive the force equation due to current element. 7M
 b) Write Maxwell's equations for static EM fields. 7M

OR

6. State and prove Biot savart's law, using Biot savart's law derive an expression for magnetic field strength H due to a finite & Infinite filamentary conductor carrying a current I and placed along Z-axis at appoint P on Y-axis. Hence deduce the magnetic field strength for the length of the conductor extending from $-z_1$ to $+z_2$. 14M

UNIT-IV

7. a) Define the wave? List out the different medias and Give the properties of different medias. Write the E&H equations in those medias. 7M
 b) A uniform plane wave propagating in medium has $E= 2 e^{-z} \sin (10^8 t - z) \mathbf{a}_y$ V/m. If the medium is characterized by $\epsilon_r=1$, $\mu_r= 20$ and $\sigma=3 \text{ S/m}$. Find \mathbf{H} , \mathbf{S} and \mathbf{T} . 7M

OR

8. a) Derive the relation between E& H in a uniform plane wave. find the value of intrinsic impedance of free space. 7M
 b) In free space $H= 0.1 \cos (2 \times 10^8 t - z) \mathbf{a}_y$ A/m, calculate i) \mathbf{E} , \mathbf{S} and \mathbf{T} ii) the time t_1 takes by the wave to travel a distance of $\lambda/8$. 7M

UNIT-V

9. a) Define transmission line? And explain different types of transmission line with neat sketches. 8M
 b) Discuss about infinite line concept. 6M

OR

10. a) Derive the expression for the input impedance of a transmission line of length. 7M
 b) A loss less line of 300Ω is terminated by a load of Z_R . if the VSWR at 200MHZ is 4.48, and the first V_{\min} is located at 6 cm from the load. calculate the reflection coefficient and Z_R 7M

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R-15

Code: 5G342

II B.Tech. II Semester Supplementary Examinations August 2021

Pulse and Digital Circuits

(Electronics and Communication Engineering)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

- 1. a) Discuss the application of Attenuator as a CRO probe 8M
b) Define the following:
 - i) Linear wave Shaping
 - ii) Lower cutoff frequency
 - iii) Rise time6M
- OR**
- 2. A 10 Hz square wave is fed to an amplifier. Calculate and plot the output waveform under the following conditions. The lower 3-dB frequency is a) 0.3 Hz b) 3 Hz c) 30Hz 14M

UNIT-II

- 3. a) State and Prove the clamping circuit theorem. 8M
b) Explain the operation of a two level diode clipper with the help of circuit diagram? 6M
- OR**
- 4. a) Explain the diode switching times with their neat diagrams 10M
b) Explain piecewise linear characteristics of the diode 4M

UNIT-III

- 5. Draw the circuit diagram of Fixed Bias Bistable Multivibrator and explain its operation with the help of wave forms at base and collector 14M
- OR**
- 6. Find the Lower and Upper Threshold voltage for Schmitt trigger circuits with following data. Assume transistors with $h_{fe}=30$, $V_{cc}=12V$, $R_{c1}=4K$, $R_{c2}=1K$, $R_1=2K$, $R_s=1K$, $R_2=6K$, $R_e=3K$ 14M

UNIT-IV

- 7. a) How is linearity corrected through adjustment of the driving waveform for a Current Time Base Generator 8M
b) What are the applications of Time Base Generators 6M
- OR**
- 8. a) Illustrate the working principle of Bootstrap time base generator 7M
b) Explain transistor Miller time base generator with neat diagram 7M

UNIT-V

- 9. a) Explain about unidirectional sampling gate with neat sketch 8M
b) Discuss the advantages and disadvantages of Unidirectional sampling gate 6M
- OR**
- 10. a) Verify the truth table of CMOS NOR gate with neat sketches 10M
b) What are the applications of sampling gates? 4M
