(DEC 211)

B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year First Semester)

Electronics and Communications

Paper I — MATHEMATICS — III

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 compulsorily.

Answer ONE question from each Unit.

1. (a) Prove that $(1 + \Delta)\ (1 - \nabla) = 1$.

(b) Evaluate $\left(\frac{\Delta^2}{E}\right) x^3$, the interval of differencing being unity.

(c) Is the function $f(x) = |x|$, $-\pi < x < \pi$ even or odd?

(d) Write the Dirichlets' conditions for expressing a function in Fourier series.

(e) Write the Fourier expansion of a function $f(x)$ in the interval $C < x < C + 2l$.

(f) Write the half range cosine series for a function $f(x)$ defined over the interval $0 < x < l$.

(g) Define integral transform of a function $f(x)$.

(h) State inversion formulae for Fourier transforms.

(i) Write the Fourier Transform of $\frac{\partial^2 u}{\partial x^2}$.

(j) Explain the solution of a system of 3 equations in 3 unknowns by Gauss elimination method.

(k) Explain the solution of $y' = f(x,\ y)$, $y(x_0) = y_0$, by Picard's method of successive approximations.

(l) Solve the differential equation $y' = f(x,\ y)$, $y(x_0) = y_0$, by the Runge-Kutta method.

(m) Write the Gauss' Backward interpolation formula.

(n) Write Simpsons' three-eighth rule.

(o) Write the advantages of central difference interpolation formulae.

UNIT I

2. (a) Find the Fourier expansion for the function $f(x) = x - x^3$ on the interval $-1 < x < 1$.

Or

(b) Express $\sin x$ as a cosine series in $0 < x < \pi$.

UNIT II

3. (a) Find the Fourier cosine transform of the function $f(x)$, if $f(x) = \begin{cases} \cos x, & 0 < x < a \\ 0, & x > a \end{cases}$.

Or

(b) Find a root of the equation $3x - 1 = \cos x$ correct to three decimals using Newton Raphsons' method.

UNIT III

4. (a) Given the values

x:	0	2	3	6
$f(x)$:	–4	2	14	158

Using Lagrange's formula for interpolation, find the value of $f(4)$.

Or

(b) From the following table, obtain the value of $\frac{d^2y}{dx^2}$ at the point $x = 0.96$.

x:	0.96	0.98	1.00	1.02	1.04
y:	0.7825	0.7739	0.7651	0.7563	0.7473

UNIT IV

5. (a) Apply (i) trapezoidal rule (ii) Simpson's $\frac{1}{3}$ rule to find an approximate value of $\int_{-3}^{3} x^4\,dx$ by taking six equal sub intervals compare it with exact value.

Or

(b) Find an approximate value of y when $x = 0.1$, if $\frac{dy}{dx} = x - y^2$ and $y = 1$ at $x = 0$, using Picards' method.

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year First Semester)

Electronics and Communications

Paper II — CIRCUIT THEORY

Time : Three hours **Maximum : 75 marks**

All questions carry equal marks.

Answer question No. 1 compulsorily.

(1 × 15 = 15)

Answer ONE question from each of the Unit. **(4 × 15 = 60)**

Answer the following.

1. (a) What is passive sign convention?

(b) Define Node, loop, Mesh of a circuit.

(c) State Max-power Transfer theorem.

(d) Show that inductors in series can be added.

(e) Define time-constant of a circuit.

(f) Define Average value of a periodic wave form.

(g) Explain about phasor.

(h) What is form factor?

(i) Find the laplace transform of $t + e^{2+}$.

(j) What is forced response, Natural responses?

(k) What are the phasor representations of capacitor and an Inductor?

(l) Find the Resonant frequency of a series RLC circuit with $R = 10\Omega$, $L = 1mh$, C = 10 nF.

(m) Define apparent power.

(n) What is selectivity of a Resonant circuit?

(o) Define average value.

UNIT I

2. (a) With proper examples explain the terms Tree, Branch, Link, Cut set. (8)

(b) Convert the following circuit to a single source and resistance using source transformation. (7)

Or

(c) Using mesh Analysis find V_3. (9)

(d) State and explain KVL and KCL. (6)

UNIT II

3. (a) Using super position theorem, find V. (7)

(b) Find the RMS value of the following. (8)

Or

(c) Using maximum power transfer theorem find the value of R_L so that maximum power is delivered to it. (8)

(d) State and explain Reciprocity Theorem. (7)

UNIT III

4. (a) Derive an expression for Q-factor and Bandwidth of a series RLC circuit.

(8)

(b) A parallel RLC circuit contains R = 10 Ω, L = 20 mh, C = 40 μF. Find Resonant frequency, Bandwidth, Q-factor. (7)

Or

(c) Find the Thevenin equivalent of the circuit.(7)

(d) Define Resonance. Obtain Resonant condition for the following circuit. (8)

UNIT IV

5. (a) State the advantages of polyphase circuits. (6)

(b) Find the expression for i(t) in the following circuit. (9)

Or

(c) Find the laplace transform of the following. (9)

(d) Explain two watt meter method of power measurement in 3-phase circuits. (6)

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year 1st Semester)

Electronics and Communications

Paper III — ELECTRONIC DEVICES

Time : Three hours **Maximum : 75 marks**

Answer question No. 1 compulsorily.

Answer ONE question from each Unit.

All questions carry equal marks.

1. (a) Define "magnetic deflection sensitivity". **(1 × 15 = 15)**

(b) State "law of junction".

(c) How does the voltage and reverse saturation current of a p-n diode vary with temperature?

(d) Describe the "Hall effect".

(e) Define "mean life time" of a carrier.

(f) What are the conditions for thermal stability?

(g) Define "base width modulation".

(h) Mention different types of turning on mechanisms of an SCR.

(i) What is "pinch off voltage"?

(j) What is "thermal instability"?

(k) What is a "varactor diode"?

(l) Define α, β and γ.

(m) What are the typical silicon n-p-n transistor junction voltages at 25ºC?

(n) What is "Q point" in a transistor circuit?

(o) Define the "intrinsic stand off ratio" of UJT.

UNIT I

2. (a) Derive the equation for electrostatic deflection sensitivity in a CRT. (6)

(b) Discuss the motion of an electron under the influence of applied magnetic field. (5)

(c) Calculate the force on a charged particle of magnitude 2 coulombs moving in an electric field of 2 V/m. (4)

Or

3. (a) Derive the "Continuity equation". (6)

(b) Distinguish between drift and diffusion currents in a semiconductor. (5)

(c) Find the concentration of holes and electrons in n-type silicon at 300ºK, if the conductivity is 300 $(\Omega\text{–cm})^{-1}$. Given that for Silicon at 300ºK, $n_i = 1.5 \times 10^{10}/\text{cm}^3$, $\mu_n = 1300\ \text{cm}^2/\text{V} - \text{sec}$ and $\mu_p = 500\,\text{cm}^2/\text{V} - \text{sec}$. (4)

UNIT II

4. (a) Derive the expression for "transition capacitance" in a p–n junction diode. (6)

(b) What is the different between avalanche and zener breakdown mechanisms? Explain the operation of a zener diode regulation with neat circuit diagram. (4)

(c) Calculate the anticipated factor by which the reverse saturation current of a germanium diode is multiplied when the temperature is increased from 25ºC to 80ºC. (5)

Or

5. (a) Draw the energy band diagram of a p–n junction and explain the working of a diode. (5)

(b) Draw the tunnel diode characteristics and explain its operation. Also write the applications of the tunnel diode. (6)

(c) A series combination of a 15 V avalanche diode and a forward biased silicon diode is to be used to construct a zero temperature coefficient voltage reference. The temperature coefficient of the Si diode is –1.7 mV/°C. What is the required temperature coefficient of the zener diode? (4)

UNIT III

6. (a) What are the different current components in a transistor? Also obtain the expression for collector current IC of CB transistor? (5)

(b) Sketch the input and output characteristics of a transistor in the CE configuration. Explain the different regions of operation and also the influence of 'early effect' on these characteristics. (6)

(c) What are the different techniques used to stabilize the operating point of a transistor? Explain. (4)

Or

7. (a) What is "thermal runaway"? Derive an expression for V_{CE}, to avoid thermal runaway in a transistor circuit. (5)

(b) Draw and explain the operation of a circuit which uses a diode to compensate for changes in I_{CO}. (5)

(c) What are the advantages of self bias circuit over fixed bias circuit? Explain. (5)

UNIT IV

8. (a) What are the differences between FET and BJT? Explain the operation of CS amplifier with the help of drain characteristics. (9)

(b) Explain the operation of SCR with respect to two transistor analogy. What are the applications of SCR? (6)

Or

9. (a) Draw the circuit diagram of UJT and explain its V–I characteristics. (6)

(b) Explain the depletion mode and enhancement mode operation of MOSFET. Explain why n-channel MOSFETs are preferred over p-channel MOSFETs. (9)

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year First Semester)

Electronics and Communication

Paper IV — EMF THEORY

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 compulsory.

Answer ONE question from each Unit.

1. (a) State the coloumbs law of force.

(b) Give one application of Gauss law.

(c) Define the potential difference.

(d) Define electric dipole.

(e) Write Laplace equation.

(f) Define electric flux density.

(g) Write Lorentz gauge condition.

(h) State the ampere's circuital law.

(i) State the Faraday's law of electromagnetic induction.

(j) Write the wave equation for a conducting medium.

(k) State the total internal reflection.

(l) Define the polarization of a wave.

(m) Define the depth of penetration.

(n) Define the propagation constant.

(o) State the poynting vector.

UNIT I

2. (a) Define the term 'Electric flux density and Permitivity of free space.

(8)

(b) A capacitor $C\mu F$ is charged to a potential difference V. Write down expression for (i) the charge Q of the capacitor (ii) the energy stored in the capacitor.

(7)

Or

3. (a) Deduce the expression of Poisson and Laplace expressing the relationship of the free space rate of variation of electric field component with distributed charge field.

(10)

(b) Apply Gauss law to show that the field at a point due to sphere of charge is the same if the total charge assumed to be a point charge located at the centre of the sphere.

(5)

UNIT II

4. (a) What is a magnetic dipole? Derive an expression for vector potential and magnetic field due to a small loop of current. (10)

(b) A solid cylindrical conductor of radius 'R' has a uniform current density. Derive the expression for 'H' both inside and outside the conductor. Plot the variation of H as a function of radial distance from the centre of the wire.

(5)

Or

5. (a) Explain the terms energy density and energy stored in a magnetic field. (8)

(b) State and explain the Biot-Savart law. How many this law be applied in obtaining the flux density B at a distance R from a thin linear conductor of infinite length with a current I.

UNIT III

6. (a) A thin cylindrical conductor of radius '*a*' infinite in length carries a current *I* calculate *H* at all points using ampere's law. (10)

(b) Explain the physical significance of Maxwell's equation. (5)

Or

7. (a) State and prove the Poynting theorem. (10)

(b) Explain the boundary condition for both static and time varying fields.

UNIT V

8. (a) Derive the wave equation from the Maxwells equation. Explain the solution for free space conditions. (10)

(b) Show that the ratio of electric and magnetic field of a uniform plane wave in a constant depending upon the medium. (5)

Or

9. (a) Derive the wave equation for a conducting medium from Maxwell's equation. (10)

(b) Explain the condition for which a uniform plane wave in free space is linearly, circularly and elliptically polarized. (5)

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year First Semester)

Electronics and Communications

Paper V — DIGITAL ELECTRONICS

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 compulsory and ONE question from each Unit.

1. (a) When a race condition will occur in an asynchronous sequential circuit?

(b) Write the excitation table of S-R flip-flop.

(c) Realize a three input NOR gate using two input NOR gates only.

(d) Simplify the Boolean expression to a minimum number of literals $x'z' + xyz + xz'$.

(e) Draw in state diagram of T flip-flop.

(f) What is a open collector TTL gate?

(g) Convert AF 3 B to binary and then find its 2's complement.

(h) Briefly explain ASCII code.

(i) What is an universal gate? Realize AND and OR operations using it.

(j) Define equivalence insequential circuits.

(k) Distinguish between multiplexer and demultiplexer.

(l) Convert the binary number $(10101 \cdot 011)_2$ into decimal and hexadecimal.

(m) Perform the subtraction (01101) – (11011) using 2's compliment.

(n) What is the difference between a Mealy machine and Moore machine?

(o) What is fundamental made operation of a sequential circuit?

UNIT I

2. (a) Determine the canonical sum-of-products form and product of sums for $f(xyz) = \bar{x}y + xyz + \bar{z} + \bar{y}$.

(b) For in function $f(ABCD) = \Sigma(0, 1, 2, 3, 4, 6, 7, 8, 9, 11, 15)$ show that Karnaugh map and find all prime implicants and indicate which are essential.

Or

3. (a) Simplify the Boolean expression $f(ABC) = \overline{A}\,\overline{B}\,\overline{C}\,(B + \overline{C}) + AB + BC$.

(b) Minimize the following function using tabular method.

$$f(A, B, C, D, E) = \Sigma\,(1, 2, 5, 6, 9, 12, 23, 28, 30, 39, 43, 48, 63)$$

UNIT II

4. (a) What is a priority encoder? Design a 4 to 2 line priority encoder and realize the circuit using logic gates. Explain its operation with the help of a truth table.

(b) Design a full subtractor and implement using NAND gates. Explain its operation with the help of a truth table.

Or

5. (a) Realize an edge triggered JK flip flop using NAND gates and explain its operation with truth table. State its advantages over R-S flip flop.

(b) Design a BCD to decimal decoder. Use NAND and AND gates for implementation.

UNIT III

6. (a) Explain how a ring counter can be used as a frequency divider. Explain your answer with neat waveform.

(b) Design a synchronous counter that steers through the state sequence give by 0, 1, 3, 2, 6, 7, 5, 4 and repeats. Use JK flip-flop and NAND gates in your implementation.

Or

7. (a) Explain Hazards and races in a sequential circuit.

(b) Explain why $f(ABC) = (\overline{A} + \overline{B})(B + C)$ has a zero hazard for the input change $ABC = 100$ to 110, but not for 100 to 000.

UNIT IV

8. (a) For the circuit shown below explain the operation and calculate (i) $h_{Fe\min}$ (ii) noise margin (iii) power dissipation if $h_{fe} = 30$ (iv) fanout.

(b) What are the important features of HTL gate? Draw and explain the circuit operation.

Or

9. (a) What is a PROM? Explain this using either bipolar or MOS approach in monolithic IC's. Illustrate with an example its application and organisation.

(b) Derive an equation for the maximunx clock frequency with dead time for a MOSFET dynamic shift register. wk 7

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year First Semester)

Electronics and Communications

Paper VI — DATA STRUCTURES USING C

Time : Three hours **Maximum : 75 marks**

Answer ALL questions.

1. (a) Define structures in C.

(b) List character string operation.

(c) Distinguish between linked list and an array.

(d) Transform postfix expression to infix expression $AB + C -$

(e) Define queue operations.

(f) List the applications of stack.

(g) Define Binary Search Tree.

(h) List the applications of Binary Tree.

(i) Representation of an AVL tree.

(j) Write time complexity of bubble sort.

(k) Distinguish between sorting and searching.

(l) List the application of Hashing method.

(m) Define radix sort.

(n) What is self reference structure.

(o) List out the binary tree traversals.

UNIT I

2. (a) Write a set of routines for implementing circular linked list.

Or

(b) Write a set of routines for implementing double linked list.

UNIT II

3. (a) What is stack? Explain stack operations using linked list.

Or

(b) What is queue? Explain queue operations using linked list.

UNIT III

4. (a) Write a routine for quick sort. Explain with example.

Or

(b) Write a routine for Radix sort. Explain with example.

UNIT IV

5. (a) Write a routine to implement the basic C binary search tree operations.

(b) Write a routine for linear search.

Or

(c) What is an AVL tree? Write a function to generate the AVL tree of height H with fewest nodes. What is the running time of your function?

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper I — MATHEMATICS — IV

Time : Three hours **Maximum : 75 marks**

All questions carry equal marks.
Answer Question No. 1 compulsorily. (1 × 15 = 15)
Answer ONE question from each Unit. (4 × 15 = 60)

1. (a) Define harmonic function.

(b) Write the real and imaginary parts of $f(z) = \sin z$.

(c) Determine the analyticity of $f(z) = \bar{z}$.

(d) Define analytic function.

(e) Show that $u = 2x - x^3 + 3xy^2$ is harmonic.

(f) Find the value of $\oint_C \frac{dz}{z^2 - 2z}$ where 'C' is the circle $|z-2| = 1$.

(g) Evaluate $\oint_C \frac{e^z}{z-1} dz$ where 'C' is the circle $|z| = 2$.

(h) Evaluate $\int_C \frac{z^2 - z + 1}{z - 1} dz$ where 'C' is the circle $|z| = 1$.

(i) Write Cauchy's integral formula.

(j) Define isolated singularity of $f(z)$.

(k) Determine the poles of $f(z) = \frac{z}{\cos z}$ and find the residue at each pole.

(l) State Cauchy residue theorem.

(m) Write the generating function for $J_n(x)$.

(n) Write the Rodrigues' formula for $P_n(x)$.

(o) Write the orthogonality property of Bessel functions.

UNIT I

2. (a) If $f(z) = \frac{x^3 y(y - ix)}{x^6 + y^2}$, $z \neq 0$, $f(0) = 0$ prove that $\frac{f(z) - f(0)}{z} \to 0$ as $z \to 0$ along any radius vector but not as $z \to 0$ in any manner.

(b) Determine the analytic function $w = u + iv$, if $V = \log(x^2 + y^2) + x - 2y$.

Or

3. (a) If $f(z) = u + iv$ is an analytic function, find $f(z)$ if $u + v = \frac{x}{x^2 + y^2}$, when $f(1) = 1$.

(b) Show that the function $e^x (\cos y + i \sin y)$ is an analytic function, find its derivative.

UNIT II

4. (a) Use Cauchy's integral formula to evaluate $\oint_C \frac{dz}{z^2 - 1}$ where 'C' is the circle $x^2 + y^2 = 4$.

(b) Find the first three terms of the Taylor series expansion of $f(z) = \frac{1}{z^2 + 4}$ about $z = -i$.

Or

5. (a) Evaluate $\oint_C \frac{z-1}{(z+1)^2 (z-2)} dz$ where 'C' is $|z - i| = 2$.

(b) Expand $f(z) = \frac{1}{z^2 - 3z + 2}$ in the region (i) $|z| < 1$ (ii) $|z| > 2$ (iii) $1 < |z| < 2$ (iv) $0 < |z - 1| < 1$.

UNIT III

6. (a) Using Cauchy residue theorem evaluate $\oint_C \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)^2 (z-2)} dz$ where 'C' is the circle $|z| = 3$.

(b) Obtain the series solution of the equation $x(1 - x) \frac{d^2y}{dx^2} - (1 + 3x) \frac{dy}{dx} - y = 0$.

Or

7. (a) Show that $\int_{-\infty}^{\infty} \frac{x^2}{(x^2 + 1)(x^2 + 4)} dx = \frac{\pi}{3}$.

(b) Solve in series the equation $\frac{d^2y}{dx^2} + x^2 y = 0$.

UNIT IV

8. (a) Prove that $P_n(x) = \frac{1}{\lfloor n \, 2^n} \frac{d^n}{dx^n} (x^2 - 1)^n$.

(b) Prove that $J_n(x) = \frac{1}{\pi} \int_0^{\pi} \cos(n\theta - x \sin\theta) \, d\theta$, n being an integer.

Or

9. (a) Show that $\int_{-1}^{1} x P_n(x) \, P_{n-1}(x) \, dx = \frac{2n}{4n^2 - 1}$.

(b) Prove that

$$\int_0^1 x \, J_n(\alpha x) \, J_n(\beta x) \, dx = \begin{cases} 0, & \alpha \neq \beta \\ \frac{1}{2}\left[J_{n+1}(\alpha)\right]^2, & \alpha = \beta \end{cases}$$

where α, β are the roots of $J_n(x) = 0$.

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper II — ELECTRONIC CIRCUITS — I

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 is compulsorily.

Answer ONE question from each Unit.

All questions carry equal marks.

1. (a) Define PIV.

(b) Give the values of ripple factor for a full wave rectifier.

(c) What is the value of the rectification efficiency of a half wave rectifier?

(d) Give the diode equation.

(e) Draw the typical input characteristics of CE configuration.

(f) Define hre of a transistor.

(g) Which transistor configuration has lowest input impedance?

(h) Define unity gain frequency.

(i) What are the two stages in a Darlington pair configuration?

(j) A CE amplifier has an upper 3 dB frequency of 20 kHz. If two such stages are cascaded together, what is the new upper 3 dB frequency?

(k) What is the advantage of RC coupled amplifier?

(l) What is cascode amplifier?

(m) Define Transconductance of FET.

(n) What is Harmonic distortion?

(o) What is miller capacitances of a transistor?

UNIT I

2. (a) Discuss the working of a PN junction as (i) Halfwave rectifier (ii) Full wave rectifier.

(b) Derive the expressions for (i) Ripple factor (ii) PIV (iii) TUF in a half wave rectifier.

Or

3. (a) Discuss the working of

(i) Capacitance filter

(ii) π section filter.

(b) Discuss the working of a Bridge rectifier.

UNIT II

4. (a) Determine the *h* parameters from the characteristics of CB configuration.

(b) Derive the expressions for voltage gain, current gain, input impedance and output impedance for a BJT using the approximate '*h*' parameter model for CE configuration.

Or

5. (a) Draw the configuration of a cascode transistor amplifier and calculate the overall gain.

(b) Analyze CE amplifier using approximate '*h*' parameter model.

UNIT III

6. (a) Explain how f_B and f_T of a BJT can be determined? Obtain the expression for the gain bandwidth product of a transistor.

(b) Obtain the current gain of CE amplifier with resistive load.

Or

7. (a) Derive the expression for i/p admittance for a CC amplifier at high frequency.

(b) Derive the expressions for hybrid π parameters C_e, $r_{bb'}$, $r_{b'e}$, C_c.

UNIT IV

8. (a) Explain the frequency response of an RC coupled amplifier.

(b) Explain CS and CD amplifier at high frequency.

Or

9. (a) Explain the low frequency common source amplifier and derive the expression for voltage gain.

(b) In a common source amplifier, FET has $r_d = 320\,\text{k}\Omega$, $\mu = 15$, the resistance $R_s = 10\,\text{k}\Omega$. Compute the voltage gain (A_V) and the output impedance for the following values of R_d : (i) 1000 kΩ (ii) 200 kΩ.

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper III — TRANSMISSION LINES AND WAVES

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 is compulsorily.

(1 × 15 = 15)

Answer ONE question from each Unit.

(4 × 15 = 60)

1. (a) Define phase velocity.

(b) What is the ideal value of VSWR?

(c) What is the necessary conditions for low loss transmission line?

(d) Give the relation between characteristic impedance and wave impedance of TM waves.

(e) Skin depth in the copper wall of wave guide operating at frequency 6.25 GHz.

(f) A load impedance of 100 Ω is connected to a 50 Ω line, VSWR of unity is obtained by connecting.

(g) Define lossless line in velocity of propagation.

(h) What is the ideal value of quality factor?

(i) Define reflection coefficient in terms of voltages.

(j) Define insertion losses and reflection loss.

(k) Draw the magnetic field pattern in TE_{11} mode.

(l) What are the advantages of waveguide over co-axial line?

(m) What are the primary and secondary constants?

(n) What is dominant mode?

(o) Find the cut-off frequency of the dominant mode for standard X-band rectangular waveguide.

UNIT I

2. (a) Derive the expression for input impedance of lossless transmission line and RF lines.

(b) Explain different losses in transmission lines.

Or

3. (a) A lossy cable which has $R = 2.25\ \Omega/m$, $L = 1.0\ \mu H$ m C = 1 pF/m and $G = 0$ operates at frequency = 0.5 GHz. Find the attenuation constant of the line.

(b) Derive the expression for input impedance of a line terminated in Z_L as shown :

UNIT II

4. (a) What is Smith chart? Give the applications of Smith chart.

(b) Derive the conditions for the distortion loss transmission line, what is loading?

Or

5. (a) Derive the expression for velocity propagation for transmission line.

(b) Derive the expression for propagation constant of infinite line.

UNIT III

6. (a) A rectangular wave guide has cross-section dimensions $a = 7$ cm, $b = 4$ cm. Determine all modes which will propagate at a frequency of

(i) 3000 MHz

(ii) 5000 MHz.

(b) Explain impossibility of TEM wave in wave guide.

Or

7. (a) Derive expression for attenuation factor and 'Q' of wave guide.

(b) Derive expression for Transverse electric wave in rectangular guides.

UNIT IV

8. (a) Derive the expression for the field components due to TM wave in circular wave guides.

(b) Compare the performance of circular and rectangular wave guides.

Or

9. (a) Explain losses in microstrip lines.

(b) Derive expression for quality factor 'Q' of microstrip lines.

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B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper IV — NETWORK ANALYSIS AND SYNTHESIS

Time : Three hours **Maximum : 75 marks**

Answer Question No. 1 compulsorily. (1 × 15 = 15)

Answer ONE question from each Unit. (4 × 15 = 60)

1. (a) Define network function.

(b) Draw the pole-zero plot for the function $F(s) = \frac{10s}{(s+1)(s+3)}$.

(c) Give the relation between Y and Z parameters.

(d) Define $ABCD$ parameters.

(e) Given $F(s) = \frac{s+6}{s^2+4s+2}$ is it positive real function (or) not.

(f) Draw the circuit diagram of a Bridged T network.

(g) Define cutoff frequency.

(h) Define characteristic impedance.

(i) What is the use of Attenuator?

(j) Define equalizer.

(k) What is meant by canonic form of realization?

(l) What are the drawbacks of constant-k filters?

(m) Define image parameters.

(n) Draw the general structure of the RC impedance function in cauer form I.

(o) What is meant by inverse network?

UNIT I

2. (a) Give the necessary conditions for driving point functions.

(b) For the ladder network shown in Fig. find

(i) Driving point input impedance $Z_{11} = \frac{V_1}{I_1}$

(ii) Transfer impedance function $Z_{12} = \frac{V_2}{I_1}$

(iii) Voltage-ratio transfer function $G_{12} = \frac{V_2}{V_1}$

Or

3. (a) Obtain the Y-parameters of the network shown in Fig.

(b) Find the Y and Z parameters for the resistive network shown in the figure.

UNIT II

4. (a) Derive the design equations for constant-k low pass filter (both T and π sections).

(b) Design a m derived high pass filter having cutoff frequency of $f_c = 4$ kHz, infinite attenuation at $f_\infty = 4.8$ kHz to fit into 600 Ω line.

Or

5. Design a composite low pass filter with cutoff frequency 2000 Hz, nominal impedance 500 Ω and the frequency of infinite attenuation 2050 Hz.

UNIT III

6. (a) Design a symmetrical bridged T-attenuator with attenuation of 40 dB and design impedance of 600 Ω.

(b) Design a lattice equalizer which will produce attenuation of 17 dB at 50 Hz and 4 dB at 2500 Hz. Calculate the loss at 500 Hz the equalizer is working between two impedances of 400 Ω each.

Or

7. (a) Design a symmetrical π – attenuator so that it provides an attenuation of 20 dB and to work into a line of 600 Ω nominal design impedance.

(b) Briefly discuss about two terminal equalizers.

UNIT IV

8. (a) What are the properties of RL impedance functions?

(b) Given $F(s) = \frac{2(s+1)(s+4)}{(s+2)(s+6)}$ synthesize $F(s)$ into cauer form I and II.

Or

9. (a) Check whether the function $F(s) = \frac{s^3 - 1}{4s^3 - 3s^2 - 1}$ is a positive real function (or) not. Give reasons.

(b) Realize $z(s) = \frac{s(s^2+2)(s^2+4)}{(s^2+1)(s^2+3)(s^2+5)}$ in Foster form I and cauer form I.

(DEC 225)

B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper V — ELECTRICAL TECHNOLOGY

Time : Three hours **Maximum : 75 marks**

Question No. 1 is compulsory.

(1 × 15 = 15)

Answer ONE question from each Unit. **(4 × 15 = 60**

All questions carry equal marks.

1. (a) What is the function of commutator in a DC machine?

(b) Write an expression for back emf of DC motor.

(c) How do you reverse the direction of rotation of DC motor?

(d) Why do you need a starter for DC motor?

(e) Name the methods of controlling speed of a DC motor.

(f) What is meant by mutual induction?

(g) Draw the vector diagram of transformer under no load conditions.

(h) What is an auto transformer?

(i) A 4 pole, 3 phase Induction motor operates at 400 V, 60 Hz. Find its synchronous speed.

(j) What happens if rotor of for induction molar is open circuited and startor is energised?

(k) What is the function of centrifugal switch in a split phase type motor?

(l) Define pitch factor.

(m) Define regulation of an alternator.

(n) Why synchronous motor is not self starting?

(o) What do you mean by pullout torque in the case of synchronous motor?

UNIT I

2. (a) What are the conditions for building up of voltage in a shunt generator? (7)

(b) A 250 V DC shunt motor on no load runs at 1000 rpm taking 5A. The field and armature resistances are 250Ω and 0.25Ω calculate speed when motor is loaded such that it it takes 41 A is armature reaction weakens flux by 3%. (8)

Or

3. (a) With help of OCC explain how to find critical resistance of Generator. (7)

(b) Draw and explain different characteristics of DC shunt and series motors. (8)

UNIT II

4. With the help of vector diagram derive the expression for regulation of a transformer. (15)

Or

5. (a) A 10 WA, 400/200 V single phase 50Hz Transformer has maximum efficiency of 92% at 80% full load at UPF. Determine the efficiency at full load 0.8 PF lag. (10)

(b) Derive the emf equation of a transformer.

UNIT III

6. (a) Explain how torque is produced in the case of 3 phase Induction motor. (7)

7. (b) With a neat sketch explain about shaded pole type FHP motor. (8)

Or

8. (a) Describe about any type of stepper motor with a neat sketch. (10)

(b) The power input to a 3 phase induction motor is 60 KW. Starter losses total 1.5 KW. Find total mechanical power developed if motor is running with a slip of 4%. (5)

UNIT IV

9. (a) Derive the emf Equation of an alternator explaining clearly the terms distribution factor and pitch factor. (10)

(b) Find the pitch factor of the winding having 36 startor slots, 4 poles, coil span 1 to 8. (5)

Or

10. Write short notes on following :

11. (a) Methods of starting synchronous motors. (8)

12. (b) Constructional features of alternators. (7)

(DEC 226)

B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics and Communications

Paper VI — SIGNALS AND SYSTEMS

Time : Three hours **Maximum : 75 marks**

Answer Q. No. 1 compulsory.

Answer ONE question from each Unit.

All questions carry equal marks.

1. (a) Define transfer function.

(b) Define causality.

(c) Give the mathematical equation of trigonometric Fourier series.

(d) What is aliasing?

(e) Define orthogonal signal.

(f) State Parseval's theorem.

(g) What are the conditions for distortionless transmission?

(h) Find the autocorrelation function of $A \cos(\omega t + \phi)$.

(i) Define cross correlation.

(j) Define conditional probability.

(k) What are the various sources of noise?

(l) What is noise figure of an ideal amplifier?

(m) Define noise equivalent bandwidth.

(n) Give the expression for the mean (or) expected value of a random variable 'X'.

(o) How thermal noise is generated?

UNIT I

2. (a) Figure shows a signal $x(t)$. For this signal sketch (i) $x(t-4)$ (ii) $x(t/10)$ (iii) $x(3t-2)$ (iv) $x(3-t)$.

(b) Find the trigonometric Fourier series for the waveform shown below.

Or

3. (a) State and prove sampling theorem.

(b) State and prove the following properties of Fourier transforms.

(i) Time shifting

(ii) Frequency shifting

(iii) Convolution

(iv) Parseval's relation.

UNIT II

4. (a) Sketch the convolution of two signals shown in Fig.

(b) Derive the relation between bandwidth and rise time of a system.

Or

5. (a) State and prove any four properties of autocorrelation functions.

(b) Explain Paley-Wiener criterion.

UNIT III

6. (a) Derive the expression for Noise figure of a 3 stage amplifier.

(b) Discuss about thermal noise.

Or

7. (a) Explain various multiple noise sources.

(b) Determine the power density spectrum of the noise voltage across terminals aa' of the resistive network shown in figure.

UNIT IV

8. (a) Discuss the properties of a probability distributed function.

(b) A voltage source generating white Gaussian noise of zero mean and power spectral density No/2 is connected to the input of the low-pass RL filter shown in figure. The noise at the filter output is denoted by $n(t)$.

(i) Find the autocorrelation function of $n(t)$.

(ii) What is the variance of $n(t)$?

Or

9. (a) Explain the properties of the power spectral density of a wide sense stationary process.

(b) Explain the transmission of a random process through a linear filter.

(DEC/DME/DCE 227)

B.Tech. DEGREE EXAMINATION, DECEMBER 2008.

(Examination at the end of Second Year Second Semester)

Electronics & Communications/Mechanical Engineering/Civil Engineering

Paper VII — ENVIRONMENTAL SCIENCE

Time : Three hours **Maximum : 75 marks**

Answer ALL the questions.

All questions carry equal marks.

1. Explain the following in 1 or 2 sentences :

   (a) Define the term Environment Development Indicator.

   (b) Enumerate the Abiotic characteristics of an Ecosystem.

   (c) Pesticide Problem.

   (d) Define the term Hot Spot of Biodiversity.

   (e) Bio-magnification.

   (f) Composting.

   (g) Global warming.

   (h) What is Indoor Air Pollution?

   (i) What is meant by Green House Gas?

   (j) Enumerate Ozone depleting substances.

   (k) What is pH of rain water?

   (l) Sustainable Life Style.

   (m) What is the difference between Population Growth and Population Explosion?

   (n) Where is the Silent Valley?

   (o) Define Flurosis.

UNIT I

2. Write an essay on the characteristic features, structure and functions of an Ecosystem.

Or

3. Briefly describe the Renewable sources of Energy.

UNIT II

4. Discuss the value of Biodiversity.

Or

5. Write an essay on Urban Solid Waste Management methods?

UNIT III

6. Write an essay on the effects of (a) Urbanisation (b) Transportation (c) Industrialisation and (d) Green Revolution on the Quality of Environment.

Or

7. Discuss about the carrying capacity of the earth.

UNIT IV

8. What are the salient features of the Environmental Protection Act, 1986 (Act 29 of 1986)?

Or

9. Write short notes on :

   (a) Stockholm Conference, 1972.

   (b) Environment Impact Assessment.

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