PART – A (10x2=20 Marks)
1. Define Image Transfer Constant and Propagation Constant of a network.
2. Find the Characteristics Impedance of the following Network.

3. Justify that m=0.6 for m-derived terminating Half Sections.
4. Mention any Two important functions of an Equalizers.
5. Design a symmetrical $p$ Attenuator having an attenuation of 60dB and a nominal impedance of 600$\Omega$.
6. Test Whether the following polynomial is Hurwitz or not $s^4+s^3+3s^2+2s+12$.
7. Test Whether the following system is stable or not using RH Criteria $s^5+4s^4+6s^3+3s^2+6s+5$.
8. Mention the Properties of Positive Real Functions.
9. Find the cutoff Frequency of the following filter.

10. Derive the condition for a filter to lie in Pass Band.

PART – B (5x10=50 Marks)
11.(a) Find the Image Impedance of the following Network

(b) Find the Characteristics Impedance of the following Network. Derive the formulae you use.

Contd..2..
12 (a) Design a m-Derived High Pass Filter (T-Section) having a cutoff frequency of 4KHz and Frequency of Infinite attenuation 3KHz and a nominal Impedance of 500Ω.
(b) Design a Band Pass Filter with a Cut off Frequencies of 10KHz, 12 KHz and a Nominal Impedance of 600Ω.

13 (a) Design a Composite High Pass Filter (p Section) having a Cutoff Frequency of 6 KHz Frequency of Infinite Attenuation is 5KHz, and a Nominal impedance of 600Ω.
(b) Find the Frequency at which Proto type T-section Low Pass Filter having a Cut off Frequency of \( f_c \) have an Attenuation of 15dB.

14 (a) Design a Symmetrical Bridge T Attenuator having an Attenuation of 60dB, and a Nominal Impedance of 600Ω. Derive the Formulae you use.
(b) Design a Full Series Equalizer for a Design Resistance of 600Ω and an attenuation of 12dB at 800Hz.

15 (a) For the Network shown Find the Driving Point Impedance, Transfer Impedance \( Z_{21} \).

(b) Find the Current \( i(t) \) in the following Circuit Using Laplace Transformations Switch closed at \( t=0 \), Assume all the initial conditions are zero.

16 (a) The Driving Point Impedance of LC Network is given by \( Z(s) = s^4 + 4s^2 + 3/s^3 + 2s \)
Synthesize using second Cauer Method.
(b) The Driving Point Impedance of RL Network is given by \( Z(s) = 5(s+1)(s+4)/(s+3)(s+5) \)
Synthesize using Foster First Method.

17 Answer any Two of the following
a) Properties of Positive Real Functions
b) Derive the Characteristic Impedance of a Lattice Network
c) Find the Laplace Transform of the following Waveform.

**********
FACULTY OF ENGINEERING
B.E. III Semester (CBCS) (ECE) (Main & Backlog) Examination,
November/December 2018
Subject: Switching Theory & Logic Design

Time: 3 Hours
Max. Marks: 70

Note: Answer all questions from Part A & any five from Part B

PART – A (10x2= 20Marks)
(Answer all questions)

1. Find the value of ‘X’ given (107)8=(241)x
2. What is an cyclic code? Explain with an example
3. Prove that NAND gate is a Universal gate.
4. Simplify the expression T(x, y, z)=x’y’ z+y+ x by eliminating redundant literals
5. What is Prime implicant and essential prime implicant?
6. Determine the minimal SOP of the function f(x,y,z)=Σ(0,4,5,7,8,9,13,15)
7. Calculate the frequency of operation of a JK-FF with t_{setup}=1ms and t_{hold}=1ms
   Assume t_{pd}=0ms
8. Draw a contact network for transmission function T_{ab}(w,x,y,z)=x'(w+y'+z')
9. Differentiate Synchronous and Asynchronous counters
10. Design a ÷9 counter using 7492 ÷12 counter.

PART – B (5x10=50 Marks)
(Answer any five questions)

11. (a) State and prove Consensus theorem.
    (b) Determine the prime implicants and simplify the following Boolean function
        f(A,B,C,D,E,F)=Σ(6,9,13,18,19,25,27,29,41,45,57,61) USING qm(Tabulation) method.

12. (a) Implement the function f=BD+BCD+AB’C’D’+A’BCD using NAND gates. Assume that both normal and complement inputs are available.
    (b) Implement the function f(a,b,c,d)=Σ(1,2,4,7,8,11,12,15) using 74153

13. (a) Convert an K_3 FF to S-R FF.
    (b) Design a 4bit Binary to Gray code convertor and implement using logic gates.

14. (a) Design a 3 bit even parity generator.
    (b) Design a serial adder with inputs x_1, x_2 carrying the two binary numbers to be added produces an output ‘z’ which represents the Sum.

15. (a) Define the ‘distance’ between two code words, Give an example? What is the condition for a code to be error detecting code?
    (b) Implement full adder and full subtractor using a, 3 to 8 decoder.

16. Design a sequence detector which produces an output ‘1’ every time the sequence ‘1001’ is detected and an output ‘0’ at all other times.

17. Write short notes on
   a) Carry look ahead adder
   b) Hazards in switching circuits
   c) Shift register application as Ring counters

************
FACULTY OF ENGINEERING
BE (CBCS) (ECE) III-Semester Examination, November / December 2018

Subject: Electronic Devices

Time: 3 Hours
Note: Answer all questions from Part-A and answer any five questions from part-B

Max. Marks : 70

PART – A (20 Marks)
1. Differentiate between transition capacitance and diffusion capacitance of PN junction diode. (2)
2. What is a reverse recovery time of a diode? (2)
3. Explain the necessity of bleeder resistor in LC filter. (2)
4. What are the advantages and disadvantages of bridge rectifier? (2)
5. What is thermal runaway in transistors? Write a condition to avoid this. (2)
6. For a transistor find β, α and I_C when I_E = 10mA, I_B = 500μA. (2)
7. Why h-parameters are preferred to analyze a circuit using BJT (2)
8. Draw the low frequency h-parameter equivalent circuit in CE configuration. (2)
9. Compare JFET and MOSFET with respect to various features. (2)
10. Sketch and explain the small signal model of JFET. (2)

PART – B (50 Marks)
11. (a) Explain the working of PN junction under forward bias and reverse bias with neat diagram? (6)
    (b) Write the differences between Zener break down and Avalanche break down in diodes? (4)
12. (a) Explain the operation of FWR with a capacitor filter and derive for ripple factor. (6)
    (b) Find the ripple factor of a FWR with C-filter for 5% ripple and frequency of 100Hz. The Required DC output voltage is 30V and load to be connected is 1kΩ. (4)
13. (a) Derive the stability factor equation for a Collector to base bias circuit. (5)
    (b) An NPN transistor with β=50 is used in a common emitter circuit with a resistance to collector to base bias. Assume V_BE = 0.7V, V_CC = 10V, R_C = 2KΩ. The bias is obtained by connecting a 100 KΩ resistance from collector to base. Find
        (i) Quiescent point
        (ii) Stability factor S (5)
14. (a) How to derive an approximate model from exact model of h-parameters. Draw an approximate model for CB amplifier. (5)
    (b) For a CB amplifier driven by a voltage source of internal resistance R_S = 600Ω the load impedance is R_L = 1200Ω. The h-parameters are h_β = 22 Ω, h_{fe} = -0.98 and h_{ob} = 0.25μA. Compute the current gain A_I, the input impedance R_i, Voltage gain A_V and output impedance R_o. (5)
15. (a) Explain the construction and operation of n-channel JFET and draw drain and transfer characteristics. (6)
    (b) Differentiate between depletion and enhancement MOSFETS. (4)
16. (a) Draw and explain V-I characteristics of a tunnel diode. (5)
    (b) Explain how a MOSFET acts a switch. (5)
17. Write short notes on the following.
    (a) LED (10)
    (b) Thermal Breakdown in transistors (10)
    (c) Silicon Controlled Rectifier (10)

*****
FACULTY OF ENGINEERING

B. E. III-Semester (CBCS) (Main & Backlog) Examination, November / December 2018

Subject: Engineering Mathematics-III (Except – I.T.)

Time: 3 Hours

Max. Marks: 70

Note: Answer all questions from Part-A, & Answer any FIVE Questions from Part-B.

PART- A (10x2=20 Marks)

1. State Cauchy-Riemann equations in polar form.

2. Evaluate \( \int_C \bar{Z} \, dz \) where \( C \) is the straight line path joining \( O \) (0, 0) to \( A \) (3, 3).

3. Locate and classify the singularity of \( f(z) = \frac{1 - \cos z}{z^3} \).

4. Find the residue of \( f(z) = \frac{1 - e^z}{z^4} \) at its pole.

5. Find the half range sine series of the function \( f(x) = e^{2x}, 0 < x < 1 \).

6. Find \( b_n \) in the Fourier series expansion of the function \( f(x) = x + x^2 \) in \([-\pi, \pi]\).

7. Form the partial differential equation by eliminating the arbitrary function \( f \) from \( x + yz = f(x^2 + y^2 - z^2) \).

8. Find the complete integral of \( p^2 - q^2 = x - y \).

9. Solve \( 5u_x + 4u_y = 0 \) subject to the condition \( u(0, y) = 6e^{-5y} \).

10. Classify the partial differential equation \( y \frac{\partial^2 u}{\partial x^2} + 2x \frac{\partial^2 u}{\partial x \partial y} + y \frac{\partial^2 u}{\partial y^2} = 0 \).

PART-B (5x10=50)

11. (a) Find the analytic function \( f(z) = u + iv \) where \( u(x, y) = e^x (xcosy - ysin) \).

(b) Evaluate \( \int_C \frac{6z^2 + z}{z^2 - 1} \, dz \) where \( C \) is the circle \( |z - 1| = 1 \).

12. (a) Expand \( f(z) = \frac{1}{(z + 1)(z + 3)} \) in a Laurent series valid for (i) \( 1 < |z| < 3 \) (ii) \( |z| > 3 \)

(b) Evaluate \( \int_{-\infty}^{\infty} \frac{dx}{1 + x^2} \).
13 Find the Fourier series of the function \( f(x) = \begin{cases} x & \text{if } 0 \leq x \leq p \\ 2p - x & \text{if } p \leq x \leq 2p \end{cases} \) and hence deduce that \( \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots = \frac{\pi^2}{8} \).

14 (a) Solve \( z(p-q) = z^2 + (x+y)^2 \)
    (b) Solve \( 2(z + xp + yp) = yp^2 \) by using Charpits method.

15 Find the solution of the heat equation \( \frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}, 0 \leq x \leq 1, t > 0 \) subject to the condition \( u(0, t) = 0 = u(1, t) \) and \( u(x, 0) = tx - x^2 \).

16 (a) Find the bilinear transformation which maps the points 1, i, -1 onto the points 0, 1, \( \infty \).
    (b) Evaluate \( \int_{C} \frac{\cos(z^3)}{(z+1)^2} \) where \( C \) is the circle \( |z| = 2 \).

17 (a) Solve \( (D^2 + DD' - 6D'^2)^2 = y \sin x \)
    (b) Find the complete and singular integrals of \( z = px + qy - 2\sqrt{pq} \)

**********
FACULTY OF ENGINEERING

BE (ECE) III - Semester (Main & Backlog) Examination, November / December 2018

SIGNAL ANALYSIS & TRANSFORM TECHNIQUES

Max Marks: 70

Time: 3 Hours

Note: Answer all questions from Part-A at one place in the same order.

Answer any five questions from Part-B.

PART - A (20 Marks)

1. Sketch the following signal \( x(t) = [U(t) - U(t-4)] \) \hspace{1cm} (2)
2. Whether the following signals are Energy or Power? \( x(n) = [n \ U(n)] \) & \( x(n) = [r(n) - r(n-2)] \) \hspace{1cm} (2)
3. Describe Analogy between vectors and Signal? \hspace{1cm} (2)
4. What are the Dirichlet conditions? \hspace{1cm} (2)
5. Explain wave symmetry? How many types of wave symmetries are there? \hspace{1cm} (2)
6. Derive Autocorrelation property of Fourier Transform? \hspace{1cm} (2)
7. Distinguish between Laplace and Fourier transform? \hspace{1cm} (2)
8. What are the properties of ROC in z-domain? \hspace{1cm} (2)
9. Find z transform of the following signal \( x(n) = [a^n \ \sin(nw) \ U(n)] \) \hspace{1cm} (2)
10. Explain the concept of Stability and Causality in Z-domain \hspace{1cm} (2)

PART - B (50 Marks)

11. (a) Obtain Trigonometric Fourier series for full wave rectified Cosine function as given below: \( x(t) = \{ A \ \cos(\omega_0 t) \} \) for \( 0 < t < \pi \). \hspace{1cm} (5)
    (b) Show that the functions \( \sin(m \omega_0 t) \) and \( \cos(m \omega_0 t) \) are Orthogonal over any interval \( [t_0 \ to \ (t_0 + 2\pi / \omega_0)] \). \hspace{1cm} (5)
12. (a) Find Fourier transform of the following signals using properties
    (i) \( x(t) = [e^{-at} \ U(t)] \) \hspace{1cm} (5)
    (ii) \( x(t) = [\delta(t+2) + \delta(t+1) + \delta(t-1) + \delta(t-2)] \) \hspace{1cm} (5)
   (b) The input and output of a Causal LTI System is described by \( \frac{dy(t)}{dt} + 3y(t) = x(t) \); find the impulse response of the system? \hspace{1cm} (5)
13. (a) Find the Laplace transform of the signal \( x(t) = \{ 2e^{-3t} \ U(t) \} \); plot ROC \hspace{1cm} (5)
    (b) Find inverse Laplace transform of \( X(s) = \frac{s}{s(s+1)(s+2)} \); and hence find Initial and final values? \hspace{1cm} (5)
14. (a) State and prove the initial and final value theorems in Z-domain \hspace{1cm} (5)
    (b) Find the impulse response and step response for an LTI system given below \( y(n) = [y(n-1) + 0.5y(n-2) + x(n) + x(n-1)] \); using Z-transform? \hspace{1cm} (5)
15. (a) Obtain a relation between Convolution and Correlation? \hspace{1cm} (5)
    (b) Find the Autocorrelation of \( x(t) = A \ \cos(\omega_0 t + \Theta) \)? \hspace{1cm} (5)
16. (a) Derive all the properties of Cross Correlation function? \hspace{1cm} (5)
    (b) Distinguish between Energy density and Power Spectral Density? \hspace{1cm} (5)
17. (a) State and prove any five properties of Z-Transform? \hspace{1cm} (5)
    (b) Write short notes on classification of Signals.

****
FACULTY OF ENGINEERING
B.E III-Semester (CBCS) (ECE) (Main & Backlog) Examination,
November / December 2018

Subject : Elements of Mechanical Engineering

Time: 3 Hour
Max. Marks : 70

Note: Answer All questions From Part-A and any FIVE questions From Part-B.

PART-A (10x2 = 20 Marks)
1. Define path function
2. Define Zeroth law of thermodynamics. What is its importance
3. What are the causes of irreversibility?
4. What is the effect of clearance volume on work input and compression?
5. State Fourier's law of heat conduction and write the S.I. units of all terms
6. What is Newton's law of cooling?
7. Write about the concept of Black body
8. Compare belt drive and gear drive with respect to power transmission
9. Define addendum and dedendum
10. What are the different types of patterns used in casting?

PART-B (5 x 10 = 50 Marks)

11. A) Define enthalpy. Compare it with internal energy
   b) A heat engine operates on Carnot cycle between source and sink temperatures 227°C and 27°C respectively. If the heat engine receives 400KJ from the source. Find the network done, heat rejected to the sink and efficiency of the engine

12 a) Distinguish between four stroke and two stroke engine with power and fuel consumption
   b) During the testing of an engine the following readings were observed: Speed-1600rpm, net load on the brake drum = 1200N, brake drum radius = 0.65m. Find the torque and brake power developed by the engine

13 a) Derive an expression for heat loss through a composite wall of layers considering conductive heat transfer coefficient
   b) A brick wall (K-0.72 W/mK) is 0.6, thick. If the temperature of the inner and outer surfaces are maintained at 100°C and 25°C respectively Calculate the heat loss through the wall per square meter. Also find the temperature at the interior point of the wall at 16cm distance from outside surface.

14 a) Write about the classification of gears and their applications
   b) Sketch epi-cyclic gear train and explain it's working with diagram

15 a) What are different milling operations? Explain any two of them with diagram
   b) Sketch and explain the working of USM

16 a) What is critical radius of insulation? Explain with of derivation
   b) Explain about forging operation in metal forming

17 Write short notes on the following:
   a) Clausis inequality
   b) Working of single stage compressor
   c) Welding process

******