Hall Ticket Number :										

R-17

Code: 7GC43

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Complex Variables and Special Functions

(Common to EEE & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
1.	a)	Show that $\beta(m,n) = \frac{\Gamma(n)}{\Gamma(m+n)}$, $m > 0$, $n > 0$.	7M	2	II
	b)	Find the general and principal values of $\log(1+i\sqrt{3})$.	7M	2	I
2.	a)	Show that $\beta\left(m,\frac{1}{2}\right) = 2^{2m-1}\beta(m,m)$.	7M	2	II
	b)	If $\tan(x+iy) = A+iB$ then show that $A^2+B^2+1 = 2A\cot 2x$.	7M	2	II
3.	a)	If $w = \log z$, find $\frac{dw}{dz}$ and Describe where w is non-analytic.	7M	1	I
	b)	Show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\log\lvert f'(z)\rvert = 0$ where $f(z)$ is an analytic function.	7M	1	I
4.	a)	Evaluate $\int_C \bar{z}dz$ from $z=0$ to $z=4+2i$ along the curve $C: x=t^2, y=t$	7M	2	V
	b)	Express $f(z) = \frac{1}{z^2-3z+2}$ as a series in the region $0<\lvert z\rvert<1$.	7M	2	II
5.	a)	Show that $\int_C e^{-2z}dz$ is independent of the path C joining the points $1-\pi i$ and $2+3\pi i$. Determine its value.	7M	2	II
	b)	Find the Taylor's series expansion of e^z about $z=3$.	7M	2	I
6.		Evaluate $\int_0^{2\pi} \frac{d\theta}{17-8\cos\theta}$ by contour integration applying the calculus of residues.	14M	3	V
7.	a)	Show that the function $w=\frac{4}{z}$ transforms the straight line $x=c$ in the $z-$plane into a circle in the $w-$plane.	7M	2	II
	b)	Find the bilinear transformation which maps the points $z=1, i, -1$ onto the points $w=i, 0, -i$.	7M	2	I
8.	a)	Show that the relation $w=\frac{5-4z}{4z-2}$ transforms the circle $\lvert z\rvert=1$ into a circle of radius unity in the $w-$plane.	7M	2	II
	b)	Find the bilinear transformation which maps the points $(-1,0,1)$ into the points $(0,i,3i)$.	7M	2	I

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Hall Ticket Number :										

R-17

Code: 7G344

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Field Theory and Transmission Lines

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
1.	a)	Point charges 5nC and -2nC are located at (2, 0, 4) and (-3,0,5) respectively. i) Determine the force on a 1nC point charge located at (1,-3,7) ii) Find the electric field E at (1,-3,7)	7M		
	b)	State Gauss law. What are the conditions required for setting up a Gaussian surface. Apply Gauss law to calculate electric field due to Infinite line Charge	7M		
2.	a)	Obtain an expression for potential energy present in a system of point charges.	7M		
	b)	Given the potential field, $V = x^2 y - 5z$, and a point P(-4,3,6). Find i. Potential *V* at point P ii. Electric field intensity at point P.	7M		
3.	a)	List out the conditions to be satisfied by a dielectric material to behave as linear, homogeneous and isotropic. What happens if the dielectric material is non-linear, non-homogeneous and non-isotropic?	7M		
	b)	State Continuity of current equation. Derive Continuity equation. Express the Continuity equation for steady currents and what do you infer from this expression.	7M		
4.	a)	State Amperes law. How to select Amperian path in Magnetic field calculations.	7M		
	b)	Apply Amperes circuit law to determine magnetic field for Infinite line current.	7M		
5.	a)	A charged particle Q is moving in presence of both electric and magnetic fields, Determine the total force exerted on the moving charged particle. If the charged particle is at rest, then what will be the total force on the charged particle?	6M		
	b)	Explain Maxwell's equations and list all of maxwell's equations in both integral and differential forms?	8M		
6.	a)	Define and explain Biot - Savart's law. Hence obtain the magnetic field due to a straight current carrying filamentary conductor of finite length.	6M		
	b)	The electric field in free space is given by $E = 50 \cos(10^8 t + \beta x)\, a_y\ V/m$ i. Find the direction of wave propagation ii. Calculate β	8M		
7.	a)	Explain and derive the concepts of Convection ,and conduction current density	7M		
	b)	What is Poynting vector? How is the Poynting theorem derived from Maxwell's curl equations? Explain Poynting theorem.	7M		
8.	a)	Draw an equivalent circuit of a two wire transmission line.	6M		
	b)	Derive Propagation constant and Characteristic impedance of general transmission line. What are the conditions to be satisfied to make a i. lossless transmission line ii. distortionless line.	8M		

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Hall Ticket Number :										

R-17

Code: 7GA41

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Managerial Economics and Financial Analysis

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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Marks

1. Explain the importance of economics in managerial decision making. 14M
2. What are the different methods of demand forecasting? Explain each of them in detail. 14M
3. What are the various types of internal economies? Explain them in brief. 14M
4. What are the important differences between perfect markets and imperfect markets? Explain. 14M
5. What are the various sources of short term finance? Explain each of them in brief. 14M
6. Rank the following investment projects according to Net present value method, assuming the cost of capital to be 12%. .

Project	Initial outlay Rs.	Annual cash inflow Rs.	Life in Years
X	25,000	5,000	7
Y	15,000	5,000	5

14M

7. Explain in detail about how ratio analysis is helpful in understanding financial statements. 14M
8. The following balances are extracted from the books of Sundar on 31-12-2017. Prepare final accounts.

Particulars	Debit Rs.	Credit Rs.
Sunndar's capital		58,100
Cash at bank	5,000	
Cash on hand	2,500	
Buildings	20,000	
Machinery	25,000	
Purchases and sales	50,000	85,000
Returns	600	800
Wages	8,000	
Power and fuel	2,000	
Salaries	6,000	
Carriage outwards	1,500	
Insurance	1,300	
Rent	1,000	
Stock (01-01-2017)	18,000	
Debtors and creditors	5,000	8,000
General expenses	2,000	
Drawings	4,000	
	1,51,900	1,51,900

Adjustments:

a) Closing stock: Rs.27, 000

b) Unexpired insurance: Rs.100

c) Outstanding rent: Rs.200

d) Write off bad debts: Rs.1, 200

e) Charge interest on capital at 5%

f) Depreciate machinery at 10%.

14M

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Hall Ticket Number :										

R-17

Code: 7G342

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Pulse and Digital Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
1.	a)	A pulse of amplitude 5 V and duration 20 μ sec is applied to high pass RC circuit having R= 10 k and C = 1000 pf. Calculate the output V0 (t) Sketch the output waveform. Calculate the tilt and undershoot.	7M	CO1	
	b)	Explain how a low pass RC circuit act as an integrator.	7M	CO1	
2.	a)	Derive the expression for tilt of a square wave after passing through a high pass RC Circuit.	7M	CO1	
	b)	Draw the output response of RC low pass circuit for a step input signal and explain in detail.	7M	CO1	
3.	a)	Describe the switching times of BJT by considering the charge distribution across the base region. Explain this for cut-off, active and saturation.	8M	CO1	
	b)	Explain the need for clamping circuits	6M	CO1	
4.	a)	Explain the operation of positive clamper circuit using diode.	7M	CO1	
	b)	State and prove clamping circuit theorem with relevant circuit and waveforms	7M	CO1	
5.		Find Lower and Upper Threshold voltage for Schmitt trigger circuits with following data. Assume transistors with hfe=30, VCC=12V, RC1=4K, RC2=1K, R1=2K, Rs=1K, R2=6K, Re=3K	14M	CO2	
6.	a)	What is a Linear time base generator? Give its Applications.	5M	CO3	
	b)	Write the differences between the voltage and current time base generators?	5M	CO3	
	c)	Why the time base generators are called sweep circuits.	4M	CO3	
7.	a)	Explain the basic principles of Miller and bootstrap time base generators.	7M	CO3	
	b)	A transistor bootstrap ramp generator is to produce a 15V, 5ms output to a 2kohms load resistor. The ramp is to be linear within 2%. Design a suitable circuit using Vcc = 22V, −VEE = -22V and transistor with hfe(min) = 25. The input pulse has an amplitude of -5V, pulse width=5ms and space width=2.5ms.	7M	CO3	
8.	a)	What is sampling Gate? And explain the basic operating principle of gates?	7M	CO4	
	b)	Draw the circuit diagram of diode - resistor logic OR gate and explain its operation	7M	CO4	

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Hall Ticket Number :										

R-17

Code: 7G341

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Random Variables and Random Processes

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
1.	a)	Define the following terms i) Sample space ii) Disjoint events iii) Probability iv) independent events	8M	CO1	L1
	b)	A box contains 4 red and 5 white balls. An experiment is to draw two balls from the box without replacement. What is the probability that the first ball is white and second ball is white?	6M	CO1	L1
2.	a)	Define a random variable. Write conditions for a function to be a random variable.	8M	CO1	L1
	b)	A random variable X has the density function $f_X(x) = \frac{1}{5}u(x)e^{-x/5}$. Find the probability of events i) $A = \{1 < X \leq 3\}$ ii) $B = \{X \leq 2.5\}$ iii) $C = \{X > 2.5\}$	6M	CO1	L1
3.	a)	Define nth moment about the origin and central moment of a random variable X.	6M	CO2	L1
	b)	Let X is an exponential density function. Determine Variance, Skew and The coefficient of skewness of X.	8M	CO2	L5
4.	a)	Define the joint distribution function and list out its properties.	6M	CO2	L1
	b)	Explain the Central Limit Theorem.	8M	CO2	L2
5.	a)	Define the joint density function and list out its properties.	6M	CO2	L1
	b)	Determine a constant b (in terms of a) so that the function $f_{X,Y}(x,y) = \begin{cases} be^{-(x+y)}, & 0 < x < a, 0 < y < \infty \\ 0, & elsewhere \end{cases}$ is a valid joint density function.	8M	CO2	L5
6.	a)	Explain about stationary random process.	6M	CO3	L2
	b)	State and prove the properties of Auto correlation function.	8M	CO3	L5
7.	a)	Explain the concept of Random process.	6M	CO3	L2
	b)	Consider the Random Process $X(t)$, defined by $X(t) = A\cos(2®f_c t + \Theta)$, where A and f_c are constants and Θ is a uniformly distributed random variable $f_\Theta(¯) = \begin{cases} 1/2®, & 0 \leq ¯ \leq 2® \\ 0, & elsewhere \end{cases}$ Examine that this Random process is Ergodic in both the mean and autocorrelation.	8M	CO3	L4
8.	a)	Define Power Spectrum. List out its properties.	6M	CO4	L1
	b)	Develop relationship between cross-power spectrum and cross-correlation function.	8M	CO4	L3

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Hall Ticket Number :										

R-17

Code: 7G343

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

Analog Communication

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* questions from the following (5 x 14 = 70 Marks)

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			Marks	CO	Blooms Level
1.	a)	Draw and explain the circuit diagram of linear detector and derive the condition for choice of time constant?	8M	1	I&II
	b)	In an AM-SC system, modulating signal is single tone sinusoid $4\cos(2\pi \times 10^3 t)$ which modulates a carrier signal $6\cos(2\pi \times 10^6 t)$. Write the equation of modulated wave. Plot the two sided spectrum of the modulated wave. Calculate the amount of power transmitted.	6M	2	III
2.	a)	What is Costas Loop; explain its principle of operation with a neat block diagram?	6M	1	I&II
	b)	A baseband signal $m_1(t)$ amplitude modulates a carrier $5\cos\omega_c t$ up to 40%. Another signal $m_2(t)$ also simultaneously modulates the same carrier. If the resultant modulation depth due to simultaneous modulation is 25%, find the amplitude of USB due to $m_2(t)$ alone.	8M	2	III
3.	a)	Define frequency modulation? Derive an expression for single tone FM wave?	6M	3	I&VI
	b)	The block diagram of a typical FM receiver is shown in Fig. The IF amplifier frequency is 10.7 MHz. The FM receiver is tuned to a carrier frequency of 100MHz. If a 10-Hz audio signal frequency modulates a 100-MHz carrier, producing β=5. Find the bandwidth required for the RF and IF amplifiers and for the audio amplifier.			

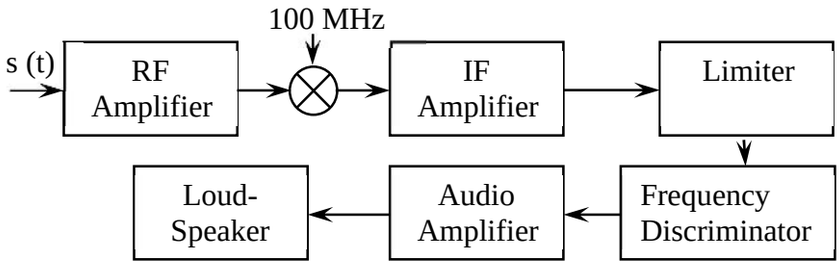

Fig: FM Receiver

			8M	2	III
4.	a)	The noise performance of a conventional AM with envelope detector is always inferior to that of a DSB-SC receiver. Justify in-terms of figure of merit.	7M	4	II&IV
	b)	With a neat sketch explain the threshold effects in FM system?	7M	4	I&II
5.	a)	Derive the expression for noise power spectral density at the phase discriminator output, draw its spectrum and derive an expression for figure of merit?	8M	4	II&VI
	b)	An AM receiver operating with a sinusoidal modulating signal has modulation index 0.8 and output signal to noise ratio 30 dB. What is the corresponding carrier to noise ratio.	6M	4	III
6.	a)	Discuss different alignment and tracking techniques in the radio receivers?	7M	5	II
	b)	Draw the block diagram of FM receiver and explain its working?	7M	5	I&II
7.	a)	Explain the principle of working of AGC in detail. Discuss the merits of delayed AGC as compared with simple AGC.	7M	1	II
	b)	Discuss the factors influencing the choice of Intermediate frequency for a radio receiver?	7M	5	I&II
8.	a)	Define and describe PPM, Explain, how a PPM signal can be generated from PWM signal?	7M	6	I&II
	b)	With the aid of the block diagram, briefly explain Frequency division multiplexing?	7M	2	I&II

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