S3 CSE QUESTION BANK

COMPUTER SCIENCE & ENGINEERING

VIDYA ACADEMY OF SCIENCE AND TECHNOLOGY

TECHNICAL CAMPUS KILIMANOOR

Index

MA201 LINEAR ALGEBRA &COMPLEX ANALYSIS (FOR ALL BRANCHES)

Module I			
Sl. No	Questions	Marks	KTU
1.	Show that $u = y^3 - 3x^2y$ is harmonic and hence find its harmonic conjugate.	8	DEC 2016
2.	Define an analytic function and prove that an analytic function of constant modulus is constant.	8	DEC 2016
3.	Check whether the following functions are analytic or not. Justify your answer i) $f(z) = z + \bar{z}$ ii) $f(z) = \|z\|^2$	4+4	MARCH2017
4.	Show that $f(z) = sinz$ is analytic for all z. Find $f'(z)$	7	MARCH2017
5.	Show that $v = 3x^2y - y^3$ is harmonic and find the corresponding analytic function	8	MARCH2017
6.	. Let $f(z) = u(x,y) + i\,v(x,y)$ be defined and continuous in some neighbourhood of a point z = x+ iy and differentiable at z itself.Then prove that the first order partial derivatives of u and v exist and satisfy Cauchy- Reimann equations	7	ARIL 2018
7.	Prove that $u = sinxcoshy$ is harmonic.Hence find its harmonic conjugate.	8	ARIL 2018
8.	Check whether the function f(z) = $\frac{Re\,(z^2)}{\|z\|^2}$ if $z \neq 0$ = 0 if z = 0 is continuous at z=0	7	ARIL 2018
9.	Let f (z) = u+iv is analytic ,prove that u = constant,v=constant are families of curves cutting orthogonally.	7	JULY2017
10	Prove that the function u(x, y) = $x^3 - 3xy^2 - 5y$ is harmonic everywhere . Also find the harmonic conjugate of u.	7	JULY2017
11	Find the points,if any,in complex plane where the function f(z)=2 $x^2 + y + i(y^2 - x)$is (i) differentiable(ii) analytic	8	JULY2017
12	Find the analytic function whose imaginary part is v(x,y) = $log(\,x^2 + y^2\,) + x - 2y$.	7	MAY 2019
Module II			
1.	Find the image of $\left\|z - \frac{1}{2}\right\| \leq \frac{1}{2}$ under the transformation $w = \frac{1}{z}$ .Also find the fixed points of the transformation $w = \frac{1}{z}$	7	DEC2016
2.	Find the linear fractional transformation that maps the points $z_1 = 0$,$z_2 = 1$,$z_3 = \infty$ onto $w_1 = -1$, $w_2 = -i$,$w_3 = 1$ respectively.	7	DEC2016

3.	Find the image of the lines x = c and y = k where c and k are constants under the transformation w = $sinz$	7	DEC2016
4.	Find the image of $0 < x < 1$, $\frac{1}{2} < y < 1$ under the mapping w = e^z	7	MARCH2017
5.	Find the linear fractional transformation that carries $z_1 = -2$,$z_2 = 0$ and $z_3 = 2$onto the points $w_1 = \infty w_2 = \frac{1}{4}$,$w_3 = \frac{3}{8}$ hence find the image of x axis	7	MARCH2017
6.	Find the image of the rectangular regio$n - \pi \leq x \leq \pi$,$a \leq y \leq b$ under the mapping $w = sinz$	8	MARCH2017
7.	Find the image of the region $\left\|z - \frac{1}{3}\right\| \leq \frac{1}{3}$ under the transformation $w = \frac{1}{z}$	8	APRIL 2018
8.	Find the image of the x axis under the linear fractional transformation $w = \frac{z+1}{2z+4}$	8	APRIL 2018
9.	Under the transformation $w = z2$, find the image of the triangular region bounded by = 1, $y = 1$ and$x + y = 1$.	8	MAY 2019
10.	Find the bilinear transformation that maps the points −1, i,−1 onto i,0,−i.	8	MAY 2019
11.	Find the image of the half plane Re(z)≥ 2,under the map w=iz	8	JULY 2017
12.	Under the transformation$w = 1/z$, find the image of $\|z - 2i\| = 2$.	8	MAY 2019
	Module III		
1	Evaluate $\int_c Re(z)\, dz$ where is the straight line from 0 to 1+2i	7	DEC2016
2	Show that $\int_0^\infty \frac{1}{1+x^4}\, dx = \frac{\pi}{2\sqrt{2}}$	8	DEC2016
3	Integrate $\frac{z^2}{z^2-1}$ counter clockwise around the circle $\|z\_1\_i\| = \frac{\pi}{2}$	7	DEC2016
4	Evaluate $\int_c \|z\|$ dz i)where c is the line segment joining i and –i ii) where c is the unit circle in the left of the half plane	3+4	MARCH2017
5	Verify Cauchy's integral theorem for z^2 taken over the boundary of the rectangle with vertices -1,1,1+i,1-I in the counter clockwise sense.	8	MARCH2017
6	Evaluate $\int_c Im(z^2)\, dz$ where c is the triangle with vertices 0,1,i counter clockwise.	7	APRIL 2018
7	Use Cauchy's Integral Formula, evaluate $\int_c \frac{z^2}{z^3-z^2-z+1}\, dz$ where c is	8	APRIL 2018

	taken counter clockwise around the circle: i)$\|z+1\|=\frac{3}{2}$ ii)$\|z-1-i\|=\frac{\pi}{2}$		
8	Find the Taylor series and Laurent series of $f(z)=\frac{-2z+3}{z^2-3z+2}$ with centre 0 in i)$\|z\|<1$ ii$1<\|z\|<2$	8	APRIL 2018
9	Find the Laurent series expansion of $f(z)=\frac{1}{1-z^2}$ which is convergent in i)$\|z-1\|<2$ ii)$\|z-1\|>2$	8	MARCH2017
10	If $(z)=\frac{1}{z^2}$, find the Taylor series that converges in $\|z-i\|<R$ and the Laurent series that converges in $\|z-i\|>R$	8	DEC 2016
11	Using Cauchy's integral formula, evaluate $\int_c \frac{e^z}{(z^2+4)(z-1)^2}$dzwhere C is the circle $\|z-1\|=2$	7	MAY2019
12	Evaluate $\int_0^{2+i} (\overline{z})^{2}$dz along (i) the real axis to 2 and then vertically to 2 + i . ii) the line $2y=x$.	8	MAY2019
Module IV			
1	Define three types of isolated singularities with an example for each	7	DEC2016
2	Determine the nature and type of singularities of i)$\frac{e^{-z^2}}{z^2}$ ii)$\frac{1}{z}$	7	MARCH 2017
3	Use Residue theorem to evaluate $\int_c \frac{30z^2-23z+5}{(2z-1)^2(3z-1)}dz$ where c is$\|z\|=1$	7	MARCH 2017
4	Evaluate $\int_0^{\infty} \frac{1}{(1+x^2)^2}dx$ using residue theorem	8	MARCH 2017
5	Determine and classify the singular points for the following functions i)$f(z)=\frac{sinz}{(z-\pi)^2}$ ii) g(z) = $(z+i)^2e^{\frac{1}{z+i}}$	7	APRIL 2018
6	Evaluate $\int_{-\infty}^{\infty} \frac{1}{(1+x^2)^3}dx$	8	APRIL 2018
7	Evaluate $\int_{-c} \frac{tanz}{z^2-1}dz$ counter clockwise around c : $\|z\|=\frac{3}{2}$ using Cauchy's Residue theorem	7	APRIL 2018
8	Using contour integration evaluate $\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9}dx$	7	JULY 2017
9	Evaluate $\int logzdz$ where C is the circle $\|z\|=1$	7	MAY2019
10	Evaluate$\int 1/(5-3sin\theta)d\theta$	8	MAY2019
11	Find all singular points and residues of the functions (a)f $(z)=(z-sinz)/z^2$ (b) f(z) =tanz	8	MAY2019
12	Evaluate $\int_{-\infty}^{\infty}\frac{x^2}{(x^2+1)(x^2+4)}$dx	8	MAY2019
Module V			
1	Solve by Gauss elimination method: $X_1 - x_2 + x_3 = 0$ $-x_1+x_2 - x_3 = 0$	5	MARCH2017

	$10x_2 + 25x_3 = 90$ $20x_1 + 10x_2 = 80$		
2	Find the rank of matrix $\begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & -4 \\ 0 & 4 & 0 \end{bmatrix}$ .Also find a basis for row space and column space	5	DEC 2016
3	Solve using Gauss elimination method: y+z-2w =0 2x-3y-3z+6w =2 4x+y+z-2w =4	6	MARCH2017
4	Reduce to echelon form and hence find the rank of the matrix $\begin{bmatrix} 3 & 0 & 2 & 2 \\ -6 & 42 & 24 & 54 \\ 21 & -21 & 0 & -15 \end{bmatrix}$	6	MARCH2017
5	Find the basis for the null space of $\begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & 8 \\ 2 & 0 & 4 \end{bmatrix}$	8	MARCH2017
6	Are the vectors (3,-1,4) (6,7,5) and (9,6,9) are linearly dependent or independent .Justifyyour answer.	5	MARCH2017
7	.Are all vectors (x,y,z) in R^3 with y -x+ z =0 form a vector space over the field of real numbers? Justify your answer.	5	MARCH2017
8	Solve using gauss elimination method: 3x+3y+2z=1,x+2y=4,10y+3z=-2,2x-3y-z=5	8	APRIL2018
9	Prove that the vectors (1,1,2),(1,2,5),(5,3,4) are linearly dependent	6	APRIL2018
10	Prove that the set of vectors V={(v_1,v_2,v3) $\in \mathbb{R}$: $-v_1+v_2+4v_3=0$} a vector space over the field $\mathbb{R}$. Also find the dimension and the basis	6	APRIL2018
11	Find the values of a and b for which the system of linear equations $x + 2y + 3z = 6$, $+ 3y + 5z = 9$,$2x + 5y + az = b$ has (i) no solution (ii) a unique solution (iii) infinitely many solutions	7	MAY2019
12	Solve the system of equations by Gauss Elimination Method: $3x + 3y + 2z = 1, x + 2y = 4, 10y + 3z = -2, 2x - 3y - z = 5$	8	MAY2019
	Module VI		
1	Diagonalize the matrix A= $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$	10	DEC 2016
2	If 2 is an eigen value of $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ without using its characteristic equation ,find other eigen values .Also find the eigen values of A^3 ,A^T ,A^{-1} ,5A, A-3I and Adj A	7	JULY2017
3	What kind of conic section or pair of straight line is given by the quadratic form $3x^2+22xy+3y^2 =0$ express $(x,y)^T$ in terms of new coordinates.	6	DEC 2016
4	Find out what type of conic section the quadratic form $Q=17x^2-30xy+17y^2 =128$ represents and transform it to the principal axis	10	DEC 2016

5	Dioganalize the matrix A=$\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$hence find A^4	8	MARCH2017
6	Determine whether the matrix is orthogonal $\begin{bmatrix} 1 & 0 & -0 \\ 1 & 1/\sqrt{2} & -1/\sqrt{2} \\ 0 & 1/\sqrt{2} & 1/\sqrt{2} \end{bmatrix}$	5	DEC 2016
7	Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$	10	MARCH2017
8	What kind of conic section is given by the quadratic form $7x_1{}^2+6x_1x_2+7x_2{}^2$= 200.Also find its equation	6	APRIL2018
9	Find the basis of null space of A=$\begin{bmatrix} 2 & -2 & 0 \\ 0 & 4 & 8 \\ 2 & 0 & 4 \end{bmatrix}$	6	MARCH2107
10	Reduce to echelon form and hence find the rank of the matrix A=$\begin{bmatrix} 3 & 0 & 2 \\ -6 & 42 & 24 \\ 21 & -21 & 0 \end{bmatrix}$	7	MARCH2107
11	Diagonalize the matrix $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$	12	APRIL 2018
12	Diagonalize the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 2 & 4 & 1 \\ 2 & 1 & 4 \end{bmatrix}$	8	MODEL QUESTION

CS201:DISCRETE COMPUTATIONAL STRUCTURES

MODULE 1

Q.NO	QUESTION	YEAR	MARKS
1.	If R is an equivalence relation on A Prove that $R^{-1}$is also an equivalence relation on A.	2016-17 MODEL QUESTION PAPER	4
2.	Find the number of reflexive and symmetric on an n - element set A	2016-17 MODEL QUESTION PAPER	3
3.	Show that (A-B)-C=A-(B U C)	JAN 2017	3
4.	Prove that every equivalence relation on a set generates a unique partition of the set and the blocks of this partition corresponds to R-equivalence.	JAN 2017	4.5
5.	Let X={1,2,…..7} and R={<X,Y>/X-Y is divisible by 3}.Show that R is an Equivalence relation. Draw the graph R.	JAN 2017	4.5
6.	Draw Hasse diagram for D_{100}.Find GLB and LUB for B={10,20},B={5,10,20,25}	JAN 2017	3
7.	Let X={1,2,3} and f,g,h be function from X to X given by f={(1,2),(2,3).(3,1),g={(1,2),(2,1),(3,3)}.Find fog,goh,f o g o h.	JAN 2017	3
8.	Let f: R → R be given by $f(x) = x^3 – 2$, where R is the set of real numbers. Find f^{-1}	DEC 2018	3
9.	Draw the Hasse diagram for the following sets under the partial ordering relation “Divides”, and indicates those which are totally ordered. {2,6,24}, {1,2,3,6,12}, {2,4,8,16}, {3,9,27,54}	DEC 2018	5
10.	Prove that every equivalence relation on a set generates a unique partition of the set with the blocks as R-equivalence classes.	DEC 2018	4
11	Let f: R → R and g: R → R, where R is the set of real numbers. Find f ∘ g and g ∘ f, where $f(x) = x^2 – 2$ and g(x) = x + 4. State whether these functions are injective, surjective, and bijective.	DEC 2018	5
12	Consider f,g and h are functions on integers $f(n) = n^2$, g(n) = n + 1, h(n) = n−1. Determine i) fogoh ii) gofoh iii) hofog	JULY 2017	6
13.	Define equivalence relation? Give an example of a relation that is not an equivalence relation?	JULY 2017	3
14.	Draw the Hasse diagram for the divisibility relation on the set A ={2,3,6,12,24,36}	JULY 2017	3
15.	Assume A={1,2,3} and ρ(A) be its power set. Let ⊆ be the subset relation on the power ser. Draw the Hasse diagram of (ρ(A),⊆)	DEC 2017	3

MODULE 2

Q.NO	QUESTION	YEAR	MARK
1.	In how many ways can the letters of the word MONDAY be arranged? How many of them begin with M and end with Y? How many of them begin with M and end with Y? How many of them do not begin with M but end with Y?	JAN 2017	4
2.	In how many different ways can the letters of the word 'MATHEMATICS' be arranged such that the vowels must always come together.	JULY 2017	3
3.	Solve the recurrence relation an = $4a_{n-1} - 4a_{n-2} + (n+1)2^n$	JULY 2017	6
4.	State Pigeonhole Principle. Prove that at least two of the children were born on the same day of the week.	JULY 2017	3
5.	If * is the binary operation on the set R of real numbers defined by a*b=a+b+2ab. Find if { R, *} is a semigroup. Is it commutative?.	JULY 2017	4
6.	Show that the set N of natural numbers is a semigroup under the operation x*y=max(x,y). Is it a monoid?	DEC 2017	3
7.	Solve the recurrence relation $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2 - 2r + 1$	DEC 2017	6
8.	What is the minimum number of students required in an English class to be sure that at least six will receive the same grade, if there are five possible grades?	DEC 2018	4
9.	From a group of 7 men and 6 women, 5 people are to be selected to form a committee, such that at least 3 men are there in the committee. In how many ways can the committee be formed?	DEC 2018	3
10.	Solve the recurrence relation T(k) – 7 T(k-1) + 10 T(k-2) = 6 + 8k with T(0) = 1 and T(1) = 2.	DEC 2018	5
11	Determine the number of integers between 1 and 250 that are divisible by any of the integers 2,3,5 and 7 by principle of inclusion exclusion.	MODEL QUESTION PAPER 2016-17	4
12	Find the recurrence relation for the Fibonacci sequence.	MODEL QUESTION PAPER 2016-17	4
13.	Solve the recurrence relation $a_n - 8a_{n-1} + 16a_{n-2} = 0$ for n >=2 and $a_2 = 16$; $a_3 = 80$.	MODEL QUESTION PAPER 2016-17	6
14.	Among 100 students,32 study mathematics, 20study physics, 45 study biology, 15 study mathematics and biology,7 study mathematics and physics, 10 study physics and biology and 30 do not study any of the three subjects. Find the number of students studying exactly one of the three subjects.	MODEL QUESTION PAPER 2016-17	4

MODULE 3

Q.NO	QUESTION	YEAR	MARK
1.	Show that inverse of an element a in the group is unique.	JAN 2017	3
2.	Show that (G,+6)is acyclic group wher G={0,1,2,3,4,5}.	JAN 2017	3
3.	Show that (Z, θ, Θ) is a ring where a θ b = a+b-1 and a Θ b = a+b–ab	JAN 2017	4.5
4.	Prove that the order of each subgroup of a finite group G is a divisor of the order of the group G	JAN 2017	4.5
5.	Show that the set {0,1,2,3,4,5} is a group under addition and multiplication modulo 6	JAN 2017	4.5
6.	Show that the set {1,2,3,4,5} is not a group under addition modulo 6.	JULY 2017	3
7.	For the set I4={0,1,2,3},show that modulo 4 system is a ring.	JULY 2017	9
8.	Prove that the order of each sub group of a finite group G is a divisor of the order of group G	JULY 2017	6
9.	Show that, for an abelian group, $(a * b)^{-1} = a^{-1} * b^{-1}$	DEC 2017	3
10.	Show that the order of a subgroup of a finite group divides the order of the group	DEC 2017	6
11	Define ring homomorphism.Show that (I,Θ,Θ) is a commutative ring with identity, where the operations Θ and Θ are defined, for any a,bϵ I, as a Θ b = a+b-1 and a Θ b = a+b-ab.	DEC 2017	9
12	What conditions to be satisfied if an algebraic system (A, +, .) is called a ring?	DEC 2018	3
13.	For a cyclic group of order n generated by an element a, show that n is the least positive integer for which $a^n = e$. (e is the identity element)	DEC 2018	4
14.	If every element in a group G is its own inverse then Prove that group G must be abelian.	MODEL QUESTION PAPER 2016-17	4
15.	State and prove Lagranges theorem.	MODEL QUESTION PAPER 2016-17	6

MODULE 4

Q.NO	QUESTION	YEAR	MARKS
1.	A={2,3,4,6,12,18,24,36} with partial order of divisibility. Determine the POSET is a lattice.	JAN 2017	3
2.	Consider the lattice D_{20} and D_{30} of all positive integer divisors of 20 and 30 respectively, under the partial order of divisibility. Show that is a Boolean	JAN 2017	3

	algebra.		
3.	Consider the Boolean algebra D_{30}.Determine the following. i) All the Boolean sub-algebra of D_{30} ii)All Boolean algebra which are not Boolean sub algebras of D_{30} having at least four elements.	JAN 2017	4.5
4.	Consider the lattice L in the figure. Find the L is distributive and complemented lattice. Also find the complement of a,b,c.	JAN 2017	4.5
5.	Simplify the Boolean expression a′b′c + ab′c + a′b′c′	JULY 2017	3
6.	Prove that every distributive lattice is modular	JULY 2017	3
7.	If (L, ≤) is a lattice, then for any a,b,c εL, the following properties hold. If b ≤ c, then i) a v b ≤ a v c ii) a ^ b ≤ a ^ c	JULY 2017	9
8.	Show that every chain is a distributive lattice.	DEC 2017	3
9.	Let (L,≤) be a lattice and a,b,c,dϵ L. Prove that if a ≤ c and b ≤ d, then (i) a ∨ b ≤ c ∨ d (ii) a ∧ b ≤ c ∧ d	DEC 2017	5
10.	Show that in a Boolean algebra,for any a,b,c (a ∧ b ∧ c) ∨ (b ∧ c) = b ∧ c	DEC 2017	3
11	Let (L, *, EXOR) be any distributive lattice. For any a, b, c element of L, show that (a*b = a*c) and (A exor b = a exor c) ==> b = c.	DEC 2018	4
12	Define a Boolean algebra. Illustrate a two element Boolean Algebra with an example	DEC 2018	5
13.	Prove that every finite group of order n is isomorphic to a permutation group of degree n	DEC 2018	5
14.	Define Lattice homomorphism and direct product of two lattices.	DEC 2018	4

MODULE 5

Q.NO	QUESTION	YEAR	MARK
1.	Without using truth tables, prove the (¬P v Q) ^ (P ^ (P ^ Q)) ≡ P ^ Q .	JAN 2017	5
2.	Convert the given formula to an equivalent form which contains the connectives ¬ and ^ only: ¬(P↔(Q→(R v P)))	JAN 2017	5
3.	Show that ((P→Q) ^ (Q→R)) → (P→R)	JAN 2017	5
4.	Show that S v R is tautologically implied by (P v Q) ^ (P→R) ^ (Q→S)	JAN 2017	5
5.	Prove the validity of the following argument “If I get the job and work hard,	JAN 2017	5

	then I will get promoted. If I get promoted, then I will be happy. I will not be happy. Therefore, either I will not get the job or I will not work hard" .		
6.	Suppose x is a real number. Consider the statement "If x^2= 4, then x=2". Construct the converse, inverse and contrapositive .	JULY 2017	5
7.	Show that (a v b) follows logically from the premises p v q, (p v q)→¬r, ¬r→(s ^ ¬t) and (s ^ ¬t) → (a v b)	JULY 2017	5
8.	Represent the following sentence in predicate logic using quantifiers i) All men are mortal, ii) Every apple is red iii) Any integer is either positive or negative	JULY 2017	6
9.	If there are meeting, then travelling was difficult. If they are arrived on time, then travelling was not difficult. They arrived on time. There was no meeting ". Show that the statements constitute a valid argument	DEC 2017	6
10.	If there was a ball game, then travelling was difficult. If they arrived on time,then travelling was not difficult. They arrived on time. Therefore, there was no ball game. Show that these statements constitute a valid argument	DEC 2018	6
11	Using truth table determine whether the conclusion ⅂P follows logically from the premises P→Q and ⅂(P ∧ Q).	DEC 2018	5
12	Show that R∨ S follows logically from the premises C ∨ D, (C ∨ D) → ⅂H, ⅂H→ (A ∧ ⅂B), and (A ∧ ⅂B) → (R∨ S).	DEC 2018	4

MODULE 6

Q.NO	QUESTION	YEAR	MARK
1	Prove that (£x)(P(x) ^ Q(x))≡(£x)(P(x) ^ (£x)Q(x))	JAN 2017	5
2	Consider the statement "Given any positive integer, there is a greater positive integer". Symbolize this statement with and without using the set of positive integers as the universe of discourse .	JAN 2017	5
3	Prove by mathematical induction that $6^{n+2}$is divisible by 43 for each positive integer n .	JAN 2017	5
4	Discuss indirect method of Proof. Show that the following premises are inconsistent 1. If Jack misses many classes through illness, then he fails high school 2. If Jack fails high School, then he is uneducated 3. If Jack reads a lot of books, then he is not uneducated 4. Jack misses many classes through illness and reads a lot of books	JAN 2017	10
5	Show that the premises "one student in this class knows how to write programs in JAVA" and "Everyone who knows how to write programs in JAVA can get a high paying job" imply the conclusion "Someone in this	JULY 2017	10

	class can get a high paying job" .		
6	Prove the following statement by contraposition: If a product of two positive real numbers is greater than 100, then atleast one of the numbers is greater than 10	JULY 2017	6
7	Express the negation of the following statement in English using quantifiers. i) If the teacher is absent, then some students do not keep quiet, ii) All students keep quiet and teacher is present	JULY 2017	4
8	Prove that √2 is irrational using proof by contradiction	JULY 2017	6
9	Prove the following (x)(P(x) v Q(x)) → (x)P(x) ^ (£x)Q(x) .	DEC 2017	10
10	Prove, by mathematical induction, that n(n+1)(n+2)(n+3) is divisible by 24, for all natural numbers n .	DEC 2017	6
11	."If there are meeting, then travelling was difficult. If they arrived on time, then travelling was not difficult. They arrived on time. There was no meeting". Show that these statements constitute a valid argument .	DEC 2017	6
12	Use mathematical induction to prove that $n^3 + 2n$ is a multiple of 3 for all $n \geq 1$.	DEC 2018	5
13	Use mathematical induction to prove that $1^2 + 2^2 + 3^2 + ... + n^2 = (n/6)(n+1)(2n+1)$ for all n is element of N.	DEC 2018	5

SWITCHING THEORY AND LOGIC CIRCUITS, CS 203

MODULE 1			
Sl.No.	**Questions**	**Marks**	**KTU, Year**
1	Convert the following decimal numbers to binary: 12.0625,673.23	3	KTU- Jul,2017
2	Obtain the 1's and 2's complement of the following numbers. 10101,0000001	3	KTU- Jul,2017
3	Describe the different schemes for representing negative numbers in binary with proper examples.	5	KTU- Jul,2017
4	Write notes on the different precision schemes used for floating point number representation.	4	KTU- Jul,2017
5	Perform the subtraction of following numbers using 2's complement subtraction. 11010-10000, 100-11000	4	KTU- Jul,2017
6	Convert the following numbers from the given base to the bases indicated a) (250.55)10 to Hexadecimal b) (357)8 to Decimal c) (110101.1011)2 to Octal	3	KTU- Jan,2017
7	Find the 9's and 10's complement of (13579)10	1	KTU- Jan,2017
8	Explain the format of single precision floating point number representation and find the decimal value corresponding to the given floating point number (11000001011110110000000000000000)2	4	KTU- Jan,2017
9	Convert the decimal numbers 596 and 386 into BCD and do the addition and subtraction operations in BCD arithmetic.	3	KTU- Jan,2017
7	What is an alphanumeric code? Why it is useful in digital computers?	2	KTU- Jan,2017
8	Convert decimal (378.93) to octal. Perform the following decimal operations in the 8421 BCD code a) (518) + (488) b) (518) − (488)	6	KTU- Dec,2017
9	Perform the following hexadecimal operations 1) 54 + 395 2) 96 − 92	4	KTU- Dec,2017
10	Find the 9's and 10's complement of (24579.12)10.	3	KTU- Dec,2018

11	Convert (455)10 to base-4,8 and 16.	3	KTU- Dec,2018
12	Subtract (9F2C)16 from (A96B)16 using 15's and 16's complement method. b) Subtract 366 from 170 in BCD using 10's complement addition. (c) Perform (417)8 – (232)8 using 8's complement addition.	9	KTU- Dec,2018
13	Represent the following decimal numbers in signed 2's complement 8-bit numbers i) +43 ii) ii) –19	3	KTU- Dec,2018
14	Convert the decimal number 3.248 x 10 4 to IEEE 754 standard single precision	2	KTU- Dec,2018
15	Perform the following operations: i) (E39)16 + (3F9)16 ii) ii) (721)8 –(32)8 iii) iii) BCD addition of 0110 0111 and 0101 0011	3	KTU- Apr,2018
	MODULE 2		
1	Prove the given Boolean identity using laws of Boolean algebra x+x′y = x+y .	2	KTU- Jan,2017
2	Express the given function in sum of minterms form F(x, y, z) = 1 Find the complement of the given Boolean function using De Morgan's theorem F(x,y,z) = x(y′ +z)	3	KTU- Jan,2017
3	What is the difference between canonical form and standard form? Which form is preferable while implementing a Boolean function with gates?	2	KTU- Jan,2017
4	Simplify the given Boolean function F (w, x, y, z) =∑(2, 3, 12, 13, 14, 15) i) Sum of Products and ii) ii) Product of Sums (use K Map)	7	KTU- Jan,2017
5	Express the following Boolean function in canonical form F(x, y, z) = x′+yz+xz′+xy′z′+xyz′	3	KTU- Jan,2017
6	Simplify the Boolean function F (w, x, y, z) = ∑m(0, 5, 7, 8, 9, 10, 11, 14, 15) using Quine-McCluskey method	6	KTU- Jan,2017
7	Using Boolean postulates simplify the following expressions: i) x+x'y ii) ii) xy+x'z+yz iii) iii) x'y'z+x'yz+xy'	3	KTU- Apr.2018
8	Express the following functions: i) F1=AB+B'C in sum of Minterms form. ii) ii) F2=A+B'C in product of Maxterms form	3	KTU- Apr.2018
9	Using K-map, simplify the Boolean function F in sum of	5	KTU- Apr.2018

	products form, using the don't care conditions d: F(w, x, y, z) = w' (x'y + x'y' + xyz) + x'z'(y+w) d(w, x, y, z)= w'x (y'z + yz') + wyz		
10	Express the following functions as product of max-terms: a) F(X,Y,Z) = Y' +XZ' + XY'Z' b) b) F(A,B,C) = C (A+B') (A' +B' + C')	3	KTU- Dec.2018
11	Use Boolean Algebra to show that A'BC'+AB'C'+AB'C+ABC'+ ABC = A+BC'	3	KTU- Dec.2018
12	Simplify F(A,B,C,D)=Σ(1,4,6,7,8,9,10,11,15) using Tabulation method and determine the prime implicants, essential prime implicants and the minimized Boolean expression.	9	KTU- Dec.2018
13	Find complement of function. F= AB'+BC'+A'C	2	KTU- Dec.2017
14	Reduce the following expressions using K-map and implement the real minimal expression in universal logic. 1)F (A,B ,C ,D)=∑ (0,1,2,3,5,7,8,9,10,12,13) 2) F(X,Y ,Z ,M)=∏ (2,8,9,10,11,12,14)	9	KTU- Dec.2017
MODULE 3			
1	Differentiate between combi national and sequential circuits.	3	KTU- Jan.2017
2	Implement the Exclusive OR operation using NAND gates only.	3	KTU- Jan.2017
3	What is the disadvantage of binary parallel adder? (2) b) Draw and explain the logic circuit of 4 bit full adder with look ahead carry.	9	KTU- Dec.2017
4	Implement a full adder circuit using a 3×8 decoder (additional gates can be used).	5	KTU- Dec.2017
5	Draw the logic diagram of 4×1 MUX and list down the applications of MUX.	3	KTU- Dec.2017
6	Design a 4-bit Binary to Gray code converter.	7	KTU- Dec.2017
7	Design and implement full subtractor by using only NAND gates.	5	KTU- Dec.2017
8	Explain 2 bit magnitude comparator using logic diagram.	4	KTU- Dec.2017
9	Given the block diagram of half-subtractor, implement a full-subtractor using half-subtractors	3	KTU- Dec.2018
10	Design and implement a decoder that decodes BCD digits (0000 to 1001).	4	KTU- Dec.2018
11			
12	Design and implement a 2-bit magnitude comparator using 4X16 decoder.	5	KTU- Dec.2018
13	Implement f(A,B,C,D)= Σ(0,2,3,6,8,9,13,14) using 8 x 1 MUX .	4	KTU- Dec.2018
14	Implement F= A(B+CD) +B'C with NAND gates.	3	KTU- Apr.2018
15	Derive the simplified output functions of a full subtractor.	3	KTU- Apr.2018

MODULE 4			
1	Give the excitation table of T Flip Flop	3	KTU- Jan2017
2	What is state diagram? Write down two advantages of state reduction technique.	3	KTU- Jan2017
3	Explain the working of JK Flipflop. What is race around condition? How is it overcome?	4	KTU- Jan2017
4	Implement JK Flip Flop using D Flip Flop.	5	KTU- Jan2017
5	Explain clocked sequential circuits with an example.	4	KTU- Jan2017
6	Give the truth table, characteristics table, excitation table and characteristic equation of SR flip-flop.	3	KTU- Dec.2017
7	Compare Synchronous and Asynchronous sequential circuits.	3	KTU- Dec.2017
8	Explain the terms: i) Race-around condition ii) Edge triggering of flip-flops	3	KTU- Apr.2018
9	Implement D flip- flop using NAND gates and explain its working.	3	KTU- Apr.2018
10	Give the characteristic table and excitation table of RS flip-flop and JK flip flop.	4	KTU- Apr.2018
11	What is a Master-slave flip-flop? Explain its working with a timing diagram.	4	KTU- Apr.2018
12	What is race around condition? Why does it occur? Discuss how master-slave flip-flop eliminates it.	9	KTU- Dec.2018
13	Design a sequential circuit with JK Flip flops to satisfy the following state equation. A(t+1)=A'B'CD + A'B'C + ACD + AC'D' B(t+1)= A'C + CD' + A'BC' C(t+1)= B D(t+1)=D'	5	KTU- Dec.2018
14	Write the excitation tables of SR, JK and T flip-flops.	3	KTU- Dec.2018
MODULE 5			
1	What is a Universal shift register?	2	KTU- Jan.2017
2	Explain how a shift register is used as a converter from i) serial to parallel data and ii) ii) parallel to serial data	8	KTU- Jan.2017
3	How does ripple counter differ from synchronous counter?	3	KTU- Jan.2017
4	Draw and explain 4 bit Johnson counter. Also draw its timing sequence.	10	KTU- Dec.2017
5	Draw and explain the different types of shift registers.	8	KTU- Dec.2017
6	List down the applications of shift registers.	2	KTU- Dec.2017
7	Design a BCD ripple counter. Also verify its operation by means of a timing diagram.	10	KTU- Dec.2018
8	Design a counter that has a repeated sequence of the following six states: 000, 001, 010, 100, 101, 110	6	KTU- Dec.2018
9	Implement a 4- bit bidirectional shift register with parallel load.	6	KTU- Dec.2018
10	Design a serial adder using a full adder and shift registers.	5	KTU- Dec.2018

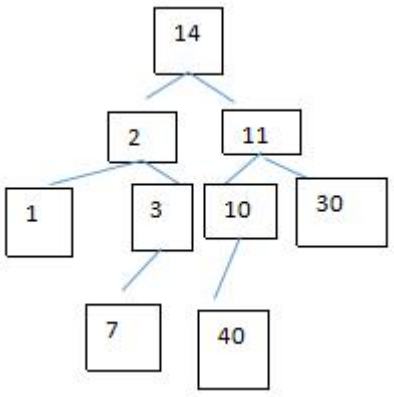
11	Give the logical configuration of shift registers. With a block diagram, explain the use of shift registers for serial transfer of data.	5	KTU- Dec.2018
12	Draw the logic diagram of a 4-bit Johnson counter and explain the working with a timing diagram.	8	KTU- Apr.2018
13	Explain the working of 3-bit Universal Shift Register.	8	KTU- Apr.2018
14	Give 2 applications of shift register.	2	KTU- Apr.2018
MODULE 6			
1	Compare RAM and ROM.	3	KTU- Jan.2017
2	Implement the following Boolean functions using a 3×4×2 PLA F1 = Σ (0, 1, 3, 4) F2 = Σ (1, 2, 3, 4, 5)	7	KTU- Jan.2017
3	Write an HDL code for a full adder in all three modelling styles.	10	KTU- Jan.2017
4	Explain the algorithm for floating point subtraction.	10	KTU- Jan.2017
5	Write short notes on PLA.	3	KTU- Dec.2017 KTU-Jul.2017
6	Give any 2 applications of ROM. Compare Static RAM and Dynamic RAM.	7	KTU- Dec.2017
7	Find the minimum size of PLA required to implement the following functions? Hence implement the following function using PLA. F1(A,B ,C) = ∑(0,2,4,7) F2(A,B ,C) = ∑(3,5,6,7)	10	KTU- Dec.2017
8	Explain the algorithm for floating point addition and subtraction	10	KTU- Dec.2017
9	Explain the various types of ROMs	4	KTU- Apr.2017
10	Draw a flow chart and explain the addition/ subtraction of two binary numbers in signed magnitude representation.	10	KTU- Apr.2017 KTU-Jul.2017
11	What size of ROM would it take to implement i. A BCD adder/subtractor with a control input to select between the addition and subtraction. ii. A binary multiplier that multiplies two 4-bit numbers. iii. Dual 4-line to 1-line multiplexers with common selection inputs.	3	KTU- Dec.2018
12	Design a combinational circuit using ROM that accepts a 3-bit binary number	7	KTU- Dec.2018

CS205: DATA STRUCTURES

Module I			
Sl. No	**Questions**	**Marks**	**Year**
1.	What do you understand by complexity of an algorithm? Write worst case and best case complexity of linear search.	**3**	**Jan 2017**
2.	What is the purpose of calculating frequency count? Compute the frequency count of the following code fragment. for(j=0;j<n;j++) printf("%d",a[i][j]);	**3**	**Apr 2018**
3.	What is stepwise refinement technique?	**3**	**Apr 2018**
4.	Write a recursive function to find the fibonacci series.	**3**	**Dec 2018**
5.	Check whether the following is true or not. 2^{n+1} is in $O(2^n)$. Give reason.	**3**	**Dec 2018**
6.	$N^2+ N = O (N^3)$ Justify your answer.	**3**	**Model Question**
7.	Describe the different notations used to describe the asymptotic running time of an algorithm.	**9**	**Jan 2017**
8.	What is the difference between recursive and iterative algorithms?	**4.5**	**Apr 2018**
9.	Write about top down and bottom up programming methodologies.	**3**	**Apr 2018**
10.	What is asymptotic notation? Describe about Big O notation.	**4.5**	**Apr 2018**
11.	Distinguish between worst-case, best-case and average-case running times of an algorithm.	**3**	**Model Question**
12.	Give example for an algorithm which has the same worst, best and average running times. `	**4**	**Model Question**
13.	What is an algorithm? How is its complexity analysed?	**3**	**Dec 2018**
14.	Explain the Big O asymptotic notation used for specifying the growth rate of functions.	**3**	**Dec 2018**
15.	Derive the Big O notation for $f(n)=n^2+2n+5$	**3**	**July 2017**
Module II			

1.	Compare and contrast singly linked list and doubly linked list.	**3**	**Jan 2017**
2.	Let LIST be a singly linked list in memory. Write an algorithm to find number of times a given data item called ITEM occurs in LIST.	**3**	**Jan 2017**
3.	Write an algorithm to perform backward traversal of a doubly linked list.	**3**	**Apr 2018**
4.	Define the following terms, with examples: (i) Header linked list (ii) Circular linked list	**3**	**Apr 2018**
5.	Draw a circular doubly linked list. Give an advantage of circular doublylinked list.	**3**	**Dec 2018**
6.	Differentiate between abstract and concrete data structure.	**4.5**	**July 2017**
7.	How can we represent a linked list in memory using arrays?	**3**	**Model Question**
8.	How a linked list can be used to represent a polynomial 5x3+4x2+3x+2? Give an algorithmto perform addition of two polynomials using linked list.	**9**	**Jan 2017**
9.	Give an algorithm to perform following operations in a singly linked list. a) Insert a new node after a given node. b) Delete last node. c) Count the number of elements in the list.	**9**	**Jan 2017**
10.	Write recursive and iterative algorithm to traverse a singly linked list.	**4.5**	**Apr 2018**
11.	Write an algorithm to insert a node after a given node in a doubly linked list.	**4.5**	**Apr 2018**
12.	What are the applications of a linked list?	**3**	**July 2017**
13.	Compare a linked list and an array implementation of a general list.	**3**	**Model Question**
14.	Explain about the use and representation of header node in linked list	**5**	**Model Question**
15.	What is the complexity of finding maximum and minimum value from an array of n values? Explain the steps of deriving complexity.	**6**	**Dec 2018**
16.	Let L1 be a singly linked list in memory. Write an algorithm	**6**	**Dec 2018**

	i) Finds the number of non zero elements in L1 ii) Adds a given value K to each element in L1		
17.	Given a doubly linked list, write an algorithm that removes a node with a particular value from the list and inserts it in the front.	**6**	**Dec 2018**
Module III			
1.	What is a circular queue? How it is different from normal queue?	**3**	**Jan 2017**
2.	What is double ended queue.	**3**	**July 2017**
3.	Write any two application of stack.	**3**	**July 2017**
4.	Free memory blocks of size 60K, 25K, 12K, 20K, 35K, 45K and 40K are available in this order. Show the memory allocation for a sequence of job requests of size 22K, 10K, 42K, and 31K (in this order) in First Fit, Best Fit and Worst Fit allocation strategies.	**3**	**Jan 2017**
5.	How a stack can be implemented using linked list.	**3**	**Jan 2017**
6.	Write an algorithm for deleting a node from a specified position in a circular queue	**4**	**Model Question**
7.	Define the properties of circular queue. How will you check whether the circular queue is i) Full ii) Empty	**3**	**Apr 2018**
8.	How will you check the validity of an arithmetic expression using stack.	**3**	**Model Question**
9.	Write a C Program/algorithm to implement two stacks using a single array.	**7**	**Apr 2018**
10.	Illustrate the result of each operation in the sequence PUSH(S,4), PUSH(S,1), PUSH(S,3), POP(S), PUSH(S,8) and POP(S) on an initially empty stack S stored in array S[1..6]	**3**	**Dec 2018**
11.	Write a function that deletes the last element of a singly linked list.	**4**	**Model Question**
12.	Concatenate two circular double linked lists A and B so that B appears after A.	**4**	**Model Question**
13.	Given five memory partitions of 100Kb, 500Kb, 200Kb, 300Kb, 600Kb (in order), how would the first-fit and best-fit algorithms place processes of 212 Kb, 417 Kb, 112 Kb, and 426 Kb (in order)? Which algorithm makes the most efficient use of memory?	**4.5**	**Apr 2018**
14.	Evaluate the following expressions written in reverse	**3**	**Apr 2018**

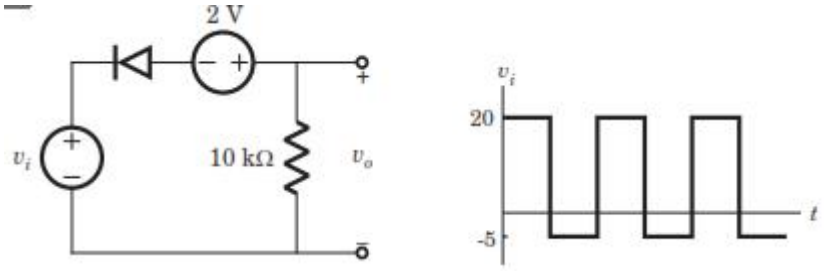
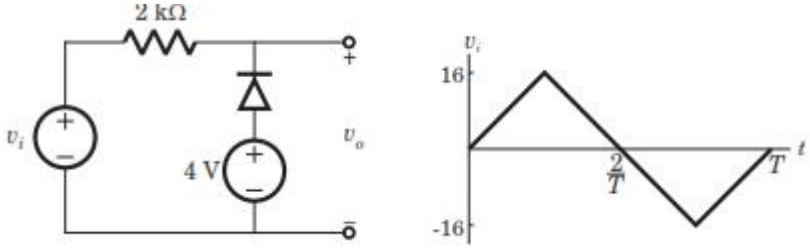
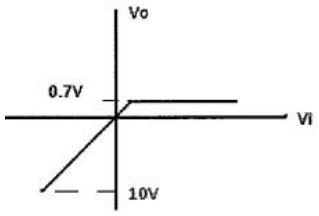
	polish notation. Assume single digit operands and ^ represents exponentiation operator i)123*+42/^ ii) 63/45-*		
15.	Write an algorithm for evaluating a postfix expression and evaluate the following postfix expression using the algorithm AB+CD/AD-EA^ + * where A=2, B=7, C=9, D=3, E=5	**9**	**Jan 2017**
16.	Write an algorithm to convert an infix expression to postfix.	**4.5**	**Apr 2018**
	Module IV		
1.	Write an algorithm to perform concatenation of two strings.	**3**	**Jan 2017**
2.	Write an algorithm to perform substring searching.	**3**	**Apr 2018**
3.	Write a recursive algorithm to perform preorder traversal.	**3**	**Apr 2018**
4.	List the properties of binary search tree. Write an algorithm to search an element from a binary search tree.	**9**	**Jan 2017**
5.	Write the non recursive preorder traversal algorithm.	**4.5**	**Jan 2017**
6.	What is the output obtained after preorder, inorder and postorder traversal of the following tree.	**3**	**Model Question**
7.	Show the structure of the binary search tree after adding each of the following values in that order: 10, 1, 3, 5, 15, 12, 16. What is the height of the createdbinary search tree?	**4.5**	**Apr 2018**
8.	Develop an algorithm to add an element into a binary search tree.	**4.5**	**Apr 2018**
9.	What are the applications of trees?	**2**	**Apr 2018**
10.	Write a recursive algorithm to perform preorder traversal.	**3**	**Apr 2018**
11.	Write a program in C to check a particular sub string is present in a given string or not? If found print its location.	**4**	**Model Question**
12.	Here is a small binary tree:  	**8**	**Model Question**

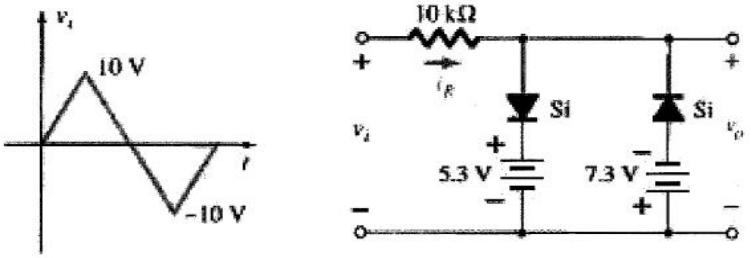
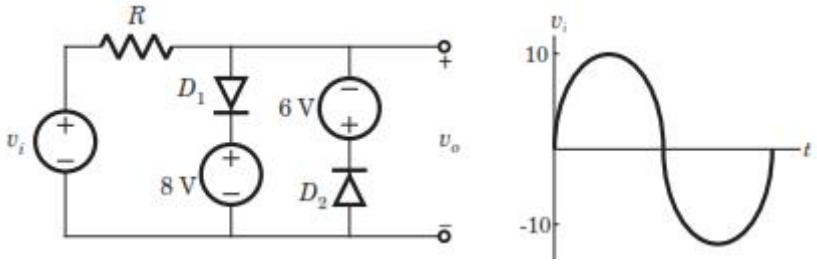
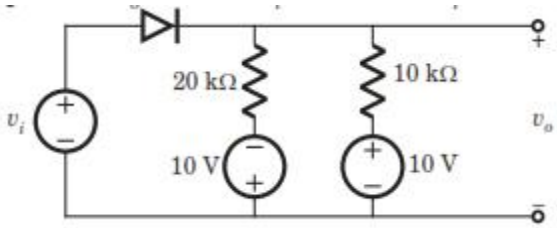
	What is the output obtained after preorder, inorder and postorder traversal of the following tree.		
13.	Write an algorithm to find a substring in a given string.	**4.5**	**July 2017**
14.	With the help of an example, explain how a binary tree can be represented using an array.	**3**	**Dec 2018**
15.	How can you reverse a string using stack? Give one example and show how you can reverse a given string using stack.	**3**	**Dec 2018**
16.	Write a recursive algorithm for pre-order traversal in a binary tree.	**3**	**Dec 2018**
	Module V		
1.	Write an algorithm for merge sort technique. Illustrate with an example. Give its complexity.	**10**	**Jan 2017**
2.	Give any two representations of graph. Give algorithm for DFS. Demonstrate DFS using suitable example.	**10**	**Jan 2017**
3.	Write algorithm for (i) Insertion sort (ii) Bubble sort.	**6**	**Jan 2017**
4.	Illustrate the insertion sort algorithm and bubble sort algorithm on input [30,20,10,60,70,40]	**4**	**Jan 2017**
5.	Write an algorithm/ C program to perform merge sort. Given the following list of numbers: [21, 1, 26, 45, 29, 28, 2] find the output obtained after each recursive call of merge sort algorithm.	**10**	**Apr 2018**
6.	Draw the directed graph that corresponds to this adjacency matrix: 0 1 2 3 0 | true false true false | 1 | true false false false | 2 | false false false true | 3 | true false true false |	**4**	**Model Question**
7.	Give the heap sort algorithm. Write the complexity of your algorithm.	**4**	**Dec 2018**
8.	Using the heap sort algorithm sort the input file [35 15 40 1 60].	**6**	**Dec 2018**
9.	Give two different types of representation for graphs.	**4**	**Dec 2018**
10.	Write an algorithm to perform selection sort in an array.	**4**	**Dec 2018**
11.	Using the selection sort algorithm, sort the input file [25, 7, 46, 11, 85].	**6**	**Dec 2018**

12.	Show (pictorially or otherwise) how split an merge take place when merge sort is applied on the following list of numbers: 2, 5, 2, 0, 10, 9, 8, 23, 7.	**6**	**Model Question**
13.	Give the algorithm/C function for inserting an element in to a heap .	**5**	**Model Question**
14.	What is max heap?Write an algorithm to perform heap sort. Give example.	**10**	**Apr 2018**
Module VI			
1.	Give an algorithm to perform binary search. Using the algorithm, search for elements 23 and 47 in the given set of elements[12 23 27 35 39 42 50].	**10**	**Jan 2017**
2.	Write C program/algorithm to perform linear search. Find the time complexity for best, worst and average case for a linear search in an array of n elements.	**10**	**Apr 2018**
3.	Write a program of binary search which tells how many comparisons it did to search an element given as user input.	**6**	**Model Question**
4.	Do the performance comparisons of Linear search and Binary search.	**6**	**Model Question**
5.	Suppose an array contains elements {10, 13, 21, 32, 35, 44, 55}. Give the steps to find an element “35” using i) linear search ii) binary search	**8**	**Dec 2018**
6.	When does binary search give the best and worst performances? Give examples of for each of these situations.	**5**	**Model Question**
7.	Define hashing. What are the properties of a good hash function? With necessary examples explain four different hashing techniques.	**10**	**Model Question**
8.	What is double hashing? Suppose size of the hash table is 11. Open addressing and double hashing is used to resolve collisions.The hash function used is H(k) = k mod 11.The second hash function is H2(k)= 5 - (k mod 5). What values will be in the hash table after the following sequence of insertions? 16 23 9 34 12 56	**10**	**Apr 2018**
9.	What are the characteristics of a good hash function?	**4**	**Dec 2018**
10.	Demonstrate the insertion of the keys 5, 28, 15, 20, 33, 12, 17, 32 into a hash table with collisions resolved by linear probing. Let the table have 9 slots, with the starting index 0. Let the hash function be h(k) = k mod 9.	**6**	**Dec 2018**

11.	Given input keys {1, 3, 23, 9, 4, 29, 19} and a hash function h(X) = X mod tablesize. The initial hash table contains 10 slots, with starting index 0. Show the resulting table after rehashing when the load factor= 0.5, using linear probing	**6**	**Dec 2018**
12.	Explain how overflow is handled in hashing	**6**	**Model Question**

CS207:ELECTRONIC DEVICES AND CIRCUITS

Module 1			
Q.NO	**QUESTION**	**YEAR**	**MARKS**
1.	Draw the circuit of a RC differentiator and write its design equation. Also draw its output waveform for a 1KHz square wave input.	Dec 2018	3
2.	A circuit and a waveform for the input voltage is given. The diode in circuit has cut in voltage V_{IN}= 0V. Sketch the waveform of output voltage. 	Model Question	3
3.	A circuit and a waveform for the input voltage is given. The diode in circuit has cut in voltage V_{IN}= 0V. Sketch the waveform of output voltage. 	Model Question	3
4.	Design a circuit to obtain the following transfer characteristics. 	Model Question	3
5.	Explain the working of the given circuit and Sketch Vo and transfer characteristics for the input shown.	Model Question	3

			
6.	Briefly explain the working of a RC differentiator and RC integrator for square wave input.	Jan 2017	3
7.	A circuit and a waveform for the input voltage is given. The diode in circuit has cut in voltage V_{IN}= 0V. Sketch the waveform of output voltage. 	Model Question	3
8.	For the circuit cut in voltage V_{IN}= 0.7V. Plot the transfer characteristics. 	Model Question	3
9.	Draw a sweep circuit with transistor acting as a switch.	Jan 2017	3
10.	With the help of a circuit diagram, explain the working of voltage doubler	Jan 2017	3
11.	Draw the circuit diagram of a voltage tripler circuit and mark the polarity and value of the voltages across each capacitor in the circuit	Jan 2017	9
12.	Compare the features of BJT with FET.	Jan 2017	3
Module 2			

1.	Explain the construction and working of Zener diode with a neat sketch.	Dec 2018	3
2.	What is line regulation and load regulation in the context of a voltage regulator.	Jan 2017	9
3.	Explain the working of simple series voltage regulator using transistor	Model Question	3
4.	Write short notes on A. Current limiting B. Current fold back protection	Dec 2018	9
5.	Explain in detail about IC 723 with necessary diagrams	Model Question	3
6.	What are 3 pin regulator ICs. List the types and its characteristics	Model Question	3
7.	Explain low and high voltage regulator using 723 IC	July 2017	3
8.	With a neat sketch explain the construction and characteristics of enhancement MOSFET.	Jan 2017	9
9.	Explain the functional diagram of LM723.	Model Question	3
10.	Explain the construction of N channel JFET and also explain the drain and transfer characteristics of the same.	July 2017	9
11.	Explain working of a voltage Tripler with the help of relevant circuit	Dec 2018	9
12.	Distinguish between enhancement and depletion mode MOSFETs	Jan 2017	3
	Module 3		
1.	What is the effect of cascading in gain and bandwidth of Amplifier?	Jan 2017	3
2.	Explain the effect of coupling capacitors at low and high frequency	Dec 2018	3
3.	Sketch and explain the frequency of RC coupled amplifier	Dec 2018	3
4.	Briefly explain the need of transistor biasing.	Dec 2018	3
5.	Write short notes on: a. Load line b. Operating point c. Thermal stability	July 2017	9
6.	Explain the effect of negative feedback on amplifiers.	Jan 2017	3

7.	With neat circuit diagrams explain: A. Fixed bias B. Self bias	Jan 2017	9
8.	Explain voltage divider bias circuit. Also explain how stability is achieved.	Model Question	3
9.	Discuss the advantages and limitations of multistage amplifier.	Dec 2018	3
10.	Explain about CS amplifier with the help of neat circuit diagram	Dec 2018	3
11.	Mention the difference between positive and negative feedback? Give one application of each.	July 2017	3
12.	Briefly describe the working of a Hartley oscillator.	July 2017	9
Module 4			
1.	State the Barkausen's criterion for oscillation	July 2017	3
2.	What is the difference between an oscillator and amplifier?	July 2017	3
3.	With a neat diagram explain about Hartley oscillator & derive the expression for frequency of oscillation and condition of oscillation.	Jan 2017	9
4.	Explain the operation of crystal oscillator with neat diagram and write the expression for its frequency of oscillation.	Dec 2018	9
5.	With neat circuit diagram explain the operation of an RC phase shift oscillator and derive the condition for oscillation and resonant frequency with BJT.	Dec 2018	9
6.	A Hartley oscillator is designed with L1 = 2mH, L2 = 20μH and a variable capacitance. Determine the range of capacitance value if the frequency of oscillation is varied between 950 to 2050 KHZ.	Jan 2017	9
7.	With a neat diagram explain about Wien bridge oscillator & derive the expression for frequency of oscillation and condition of oscillation.	Jan 2017	9
8.	Explain the working of bistable multivibrator with the help of necessary diagrams.	July 2017	3
9.	Draw the circuit of an astable multivibrator using transistors and explain its working with a sketch of the waveforms at the collector and base terminals of both the transistors	Dec 2018	9

10.	Explain the working of monostable multivibrator with the help of necessary diagrams.	July 2017	3
11.	Design an astable multivibrator for a frequency of 1 KHz. Also sketch the output waveforms.	Dec 2018	9
12.	Draw the circuit of an RC coupled amplifier and explain the function of each element. Sketch the frequency response and write the reasons for gain reduction in both ends.	Dec 2018	9
	Module 5		
1.	What is a differential amplifier? What are its advantages?	Jan 2017	10
2.	What are the applications of differential amplifier?	Model Question	10
3.	What is meant by CMRR of a Differential amplifier?	July 2017	3
4.	Draw the circuit diagram of an emitter coupled BJT differential amplifier and derive expressions for differential gain, common mode gain, CMRR, input impedance and output impedance.	July 2017	10
5.	List out the ideal characteristics of an op-amp. What are their typical values for 741 IC.	Dec 2018	10
6.	With neat diagram explain the working and transfer characteristics of non inverting Schmitt trigger using op-amp.	Dec 2018	10
7.	With necessary equations explain the working of integrator circuit using op-amp	Dec 2018	3
8.	Design a summing amplifier using op-amp to yield $V_o = -V_1+2V_2-3V_3$	July 2017	10
9.	Explain the working of summing amplifier and subtractor circuit using	Jan 2017	10
10.	With necessary equations and figures explain Wien bridge oscillator using op-amp	July 2017	9
11.	With circuits and equations show that an op-amp can act as integrator , differentiator, adder, subtractor.	Dec 2018	10
12.	Define: (1) Slew rate, (2) CMRR, (3) offset voltage (4) Offset current (b) What are their practical values for parameters of op-amp IC 741	Jan 2017	10
	Module 6		
1.	Explain the working of astable multivibrator using 555 timer IC	Model Question	10

2.	Explain the working of monostable multivibrator using 555 timer IC	Jan 2017	10
3.	Explain the working principle of R-2Rladder type DAC	July 2017	10
4.	Design a first order Butterworth low pass filter for a cut off frequency of 2KHz and pass band gain of 2	Model Question	10
5.	Design a monostable multivibrator using 555 timer for a pulse period of 1ms	Model Question	10
6.	Draw the circuit diagram and frequency response of a first order Butterworth low pass filter using op-amp and explain its working	Dec 2018	10
7.	List and explain the different specifications of data convertors	Dec 2018	10
8.	With neat circuit diagram explain dual slope ADC	July 2017	10
9.	Design a first order Butterworth high pass filter for a cut off frequency of 2KHz and pass band gain of 1	July 2017	10
10.	Write short notes on: a. Successive approximation ADC b. Flash ADC	Jan 2017	10
11.	Write design equations and pin out of 555 TIMER IC working as astable multivibratot to generate a wave form of 1KHz., with 50% duty cycle.	Model Question	10
12.	Describe the working of a binary weighted D/A Converter, with example	July 2017	10

HS200:BUSINESS ECONOMICS

Q.NO	QUESTION	MARKS
13.	a. What are basic or central economic problems? b. How will you use PPC to explain opportunity cost?	5+5
14.	Explain the Marginal utility theory with the help of a figure?	10
15.	What is meant by economic problem? What are the causes of emergence of an economic problem?	10
16.	What is diminishing marginal utility ? Explain the law with the help of an empirical example.	10
17.	Explain 1 Marginal utility 2 Total utility3 Micro economics4 Utility5 Opportunity cost	10
18.	A country producing wheat and cloth in a neutral proportion, a sudden change in the technology will lead high production in both of the product. Explain with the help of PPC ?	10
19.	a. Examine the meaning and scope of Business Economics? b. Explain the factors affecting Utility?	6+4
20.	a. Explain the shift in PPC with the help of figure? b. What are the difference between marginal utility and total utility?	6+4
21.	a. What is business economics? b. How does a business economics helps a manager in decision making?	5+5
22.	a. Define a production possibility curve? Mark full employment and Under utilization of resources in a PPC. b. Cigarette may be harmful but it may posses utility. Do you agree? Give reasons	5+5
13.	Explain 1. Deman ,2. Joint demand 3. Veblan good 4. Opportunity cost 5. Supply	10
14.	a. Degrees of price elasticity? b. Explain change in demand? 1. Expansion and contraction 2. Increase and decrease in demand	6+4

15.	a. Law of variable proportion with the help of a figure? b. What is production? Explain the factors of production?	6+4
16.	a. Cobb- Dugless production function? Suppose the production function is given as $Q=2K^{1/2}L^{1/2}$ 1. What will be output when K=16 & L=36? 2. what is marginal product of labour? b . Draw a total cost curve with the help of Tvc & Tfc?	6+4
17.	a. How is the equilibrium price of a commodity determined? Suppose the number Of buyers of a commodity increases. How does it affects market demand curve And equilibrium price? Draw a diagram and explain. b. Suppose the finance minister increase the tax on those commodities Where demand is highly elastic. What happens to total tax revenue? Why?	6+4
18.	a. What is a production function? Distinguish between Fixed proportion and variable proportion. b. Suppose the production function is given as $Q=3L^{1/2}K^{1/2}$. Find average and marginal product of labour when L=9 and K=4.	5+5
19.	Show the law of variable proportion with help of a figure?	10
20.	a. Determining the factors affecting demand? b. Point out the factors affecting supply?	7+3
21.	a. What are the different types of demand? b. Explain the Cobb-Duglas produo=ction function and bring out its merits and demerits?	6+4
22.	Explain the different types of elasticity?	10
13.	a. Find out a break even point in a break even analysis with the help is figure ? b. Suppose the monthly fixed cost of a firm Rs 20000/-, Variable cost 30000/-, sales 60000/- Find out BEP ?(Break Even Point)	5+5
14.	Explain perfect competition with the price determination?	10
15.	a. what are the basic difference between Monopoly And Monopolistic competition ? b. What is the marginal importance of BEP	4+6
16.	Explain 1 Real cost 2 Social cost 3 Replacement cost 4 short run cost 5 Fixed cost 6 opportunity cost	10
17.	a. Complete the following short run cost schedule?	6+4

	<table><tr><td>Output</td><td>TC</td><td>TFC</td><td>TVC</td><td>MC</td></tr><tr><td>0</td><td>100</td><td>--------</td><td>-------</td><td></td></tr><tr><td>1</td><td>---------</td><td>--------</td><td>50</td><td>-------</td></tr><tr><td>2</td><td>---------</td><td>--------</td><td>-------</td><td>40</td></tr></table> b. What are the difficulties of measurement now national income?	
18.	a. What is a short run shutdown point? b. Suppose price of a product is less than AC. Will a firm stop Production or continue? Why?	3+7
19.	a. State the main features of monopoly market? b. Demand curve facing a firm under perfect competition is perfectly elastic. Why?	6+4
20.	Explain 1. Marginal revenue 2. Margin of safety 3. Variable cost 4. Total revenue	10
21.	a.What is meant by stock and flow? b. Explain break even analysis with diagram?	5+5
22.	Pricing under oligopoly market requires some assumptions about the behavior of rival firms. Several models have been put forward for this purpose. Discuss the two prominent models explaining the behavior of rival firms in an oligopoly market?	10
13.	a. What is repo rate? How does RBI use it as a measure to control inflation? b. National income of a country is given as 2850. If the annual depreciation Is 300, net factor income from abroad is 50, and net indirect tax is 100, Estimate GDPmp?	4+6
14.	Explain 1 Intermediate goods 2 Gross Domestic product 3 Net National Product 4 private income. 5 personal disposable income.	10
15.	a. What are the difference between product method and income method of national income measurement b. Explain final expenditure method	6+4
16.	a. Fisher equation?	3+3+4

<table>
<tr><td></td><td>b. Types of inflation?

c. What is demand pull inflation & explain the causes?</td><td></td></tr>
<tr><td>17.</td><td>What are the main measures to control inflation?</td><td>10</td></tr>
<tr><td>18.</td><td>a. Trade cycle?

b. How would you define money?</td><td>6+4</td></tr>
<tr><td>19.</td><td>What is deflation and Explain the causes of deflation?</td><td>10</td></tr>
<tr><td>20.</td><td>a. State the Cambridge version of quantity theory of money?

b. Major causes of inflation in a country?</td><td>5+5</td></tr>
<tr><td>21.</td><td>How is national income estimated? Bring out the difficulties involved in National income estimation in under developed countries?</td><td>10</td></tr>
<tr><td>22.</td><td>What is the risk join with Bitcoins? State your points.</td><td>10</td></tr>
<tr><td>13.</td><td>a. What are the main process of capital budgeting?

b. Explain the types of investment projects?</td><td>5+5</td></tr>
<tr><td>14.</td><td>a. Initial investment Rs - 2500/-, cost of capital- 10% find out NPV on the Following cash flows given below?

<table><tr><td>Year</td><td>Cash</td></tr><tr><td>1</td><td>900</td></tr><tr><td>2</td><td>800</td></tr><tr><td>3</td><td>700</td></tr><tr><td>4</td><td>600</td></tr><tr><td>5</td><td>500</td></tr></table></td><td>10</td></tr>
<tr><td>15.</td><td>a . Limitations of NPV method?

b. Merits of IRR method?

c. What is pay back method? Write down two merits and demerits Of payback method?</td><td>3+3+4</td></tr>
<tr><td>16.</td><td>.a.What are the basic sources of Risk ?

b. What do you mean by decision taking under uncertainty?</td><td>6+4</td></tr>
<tr><td>17.</td><td>a . what is cost benefit analysis? Point out the limitations?

b. What is IRR and its limitations?</td><td>5+5</td></tr>
<tr><td>18.</td><td>a. Suppose the initial investment in a project is estimated as 25000 and the cost of capital is 10%. Estimate the NPV of the future cash flows after tax given</td><td>6+4</td></tr>
</table>

<table>
<tr><td></td><td>below and state weather the project will be accepted or not.
<table><tr><td>Year</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Cash flow</td><td>9000</td><td>8000</td><td>7000</td><td>6000</td><td>5000</td></tr></table>b. What do you mean by a risky situation in business,How is decision taken under risk?</td><td></td></tr>
<tr><td>19.</td><td>a. From the following data choose the best project based on payback period?

Capital cost - Project A =15000, Project -B=15000
<table><tr><td>Cash flow</td><td>Project A</td><td>Project B</td></tr><tr><td>1</td><td>5000</td><td>4000</td></tr><tr><td>2</td><td>5000</td><td>4000</td></tr><tr><td>3</td><td>5000</td><td>4000</td></tr><tr><td>4</td><td>2000</td><td>3000</td></tr><tr><td>5</td><td>1500</td><td>2000</td></tr><tr><td>6</td><td>1500</td><td>8000</td></tr></table>b. What are the limitations of payback method?</td><td>6+4</td></tr>
<tr><td>20.</td><td>a. Draw a decision tree?

b. What is meant by capital budgeting?</td><td>5+5</td></tr>
<tr><td>21.</td><td>How does sensitivity analysis help a decision maker to choose a project ?
What are the limitations?</td><td>10</td></tr>
<tr><td>22.</td><td>Explain the types of forecasting? (minimum 5 types)</td><td>10</td></tr>
<tr><td>13.</td><td>a. Classify the following items under Asset and Liability sides?
Petty cash, Accrued interest, copy right, Sundry debtor, Bills receivable, Dividends payable, Inventory, patent, Wages, Pension</td><td>6</td></tr>
<tr><td>14.</td><td>a.Explain causative model?

b. GST?</td><td>6+4</td></tr>
<tr><td>15.</td><td>a.Write for limitations of a balance sheet?

b. What is a balance sheet?</td><td>6+4</td></tr>
<tr><td>16.</td><td>Explain

1.Liquidity ratio
2.Current ratio
3.working capital
4.Quick ratio
5.Leverage ratio</td><td>10</td></tr>
<tr><td>17.</td><td>a. What are the features of forecasting?

b. What is Delphi method?

c. What is Naive method?</td><td>4+3+3</td></tr>
</table>

18.	What are the difference between money market and capital market?	10
19.	a. International financing? b. Foreign Direct Investment FDI c. Foreign portfolio Investment FPI d. Foreign Institutional investment FII	1+3+3+3
20.	a. What are the basic difference between FDI&FPI? b. Point out three advantages and disadvantages of foreign Direct investment FDI	5+5
21.	a. The principles of Taxation? b. Point out the difference between direct and indirect taxes?	5+5
22.	Explain the main sources of capital?	10