ACAD-27 a)	Shri Ramdeobaba College of Engineering and Management, Nagpur -440013	Iss. No.: 01, Rev. No.: 00
Ref. Clause(s): 9.1		
Department: EC	Semester : V Shift: I and II Course Code: ECT 351 Course Name: Electromagnetic Waves	Date of Rev: 01/01/2018 Page: 01/01
Programme: BE	Test: 1	Date of Exam: 1/10/2022
Max Marks: 15	Session: 2022-23	Time: 12 pm to 1 pm

Instructions:

1. Q 1 is compulsory.
2. Illustrate your answer with neat sketches wherever necessary.
3. Assume suitable data wherever necessary.

(handwritten notes in margin:)
$\frac{80}{50} - j\frac{30}{50} = 1.6 - 0.6j$
$d = 0.20\lambda$
$zL = L$
$zd =$
$zd = L$

Question No.	Questions	Marks	CO	EO
1 a)	What is reflection coefficient? Derive the expression of reflection coefficient in terms of load impedance Z_L and Characteristic impedance Z_0. $\quad K = \frac{ze - z0}{z_R - z0} \Rightarrow \frac{Vr}{Vi} \Rightarrow$	4	CO1	L2
1 b)	A transmission line of 50 Ω characteristic impedance is terminated in a load impedance of $80 - j\,30\ \Omega$. Find the impedance and complex reflection coefficient at a distance of 0.20 λ from the load. What is VSWR measured on the line?	4	CO1	L3
2 a)	Analyse the behaviour of propogation constant of uniform plane wave in good conducting medium.	3	CO2	L3
2 b)	A material has dielectric constant 25 and conductivity 2×10^6 mho/m. What is the cut off frequency above which the material cannot behave like a good conductor? If the frequency of operation of EM wave is 10 MHz, find the phase constant of the wave.	4	CO2	L3
OR				
2 a)	Analyse the behaviour of propagation constant of uniform plane wave in perfect dielectric medium.	3	CO2	L3
2 b)	A uniform plane wave is travelling at a frequency of 500 MHz in a vacuum along +X direction. The electric field of the wave at some instant is given as $\bar{E} = 4\hat{y} - 7\hat{z}$. $= 16 + 49 = 65 \quad \beta = \omega\sqrt{\mu\epsilon}$ Predict the phase constant of the wave and also the vector magnetic field.	4	CO2	L3

(handwritten working at bottom:)
$\frac{65}{A^2 + B^2} = (120\pi)^2$
$A^2 + B^2 = \frac{65}{(120\pi)^2}$
$\frac{49 + 49B^2}{16} = \frac{65}{(120\pi)^2}$

$4A - 7B = 0$
$4A = 7B$
$A = \frac{7}{4}B$

1

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Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC	Semester : V Shift: I and II Course Code: ECT 351 Course Name: Electromagnetic Waves	Page: 01/01
Programme: BE	Test: 2	Date of Exam: 10/12/2022
Max Marks: 15	Session: 2022-23	Time: 12 pm to 1 pm

Instructions:

1. Q 1 & Q 2 is compulsory.
2. Solve any one question from Q 3 and Q 4.
3. Assume suitable data wherever necessary.

Question No.	Questions	Marks	CO	EO
Q 1 a)	Explain phase velocity, group velocity and guide wavelength in parallel plane waveguide.	2M	CO5	L1,3
Q 1 b)	A wave is propagated in a parallel plane waveguide, the frequency is 5 GHz and the plane separation is 6 cms. Find: i) The cut off wavelength for the lowest mode of TE waves. ii) For this mode find guide wave length. iii) Also find the corresponding group and phase velocity.	3M	CO5	L1,3
Q 2 a)	Derive the expression for cut off frequency in rectangular waveguides.	2M	CO5	L2,3
Q 2 b)	A rectangular wave guide has dimensions of 2.5 cm x 1.5 cm. What is the lowest frequency at which this waveguide can be used for transmission of electromagnetic energy? If the guide is used in this mode but at a frequency which is double the "lowest possible" frequency, calculate group velocity and phase velocity of the transmitted wave.	3M	CO5	L1,3
Q 3 a)	Discuss phenomenon of radiation in antennas.	2M	CO3	L1
Q 3 b)	Discuss the types of radiators along with terms FNBW and HPBW with respect to antenna.	3M	CO3	L1
OR				
Q4	Estimate the power density of the transmitted and the reflected wave when a uniform plane wave having power density of 30 W/m² is incident from air to dielectric interface at the angle of incidence 55°. The electric field vector for the wave lies perpendicular to the plane of incidence. The relative permittivity of the dielectric medium is 25 and operating frequency of wave is 50 MHz.	5M	CO4	L4

$f = 50 M$

$\epsilon_r = 25$

$\theta_i = 55$

$S = 30$

$Pd = T$?

$Pd = R$?

ACAD-27 a)	Shri Ramdeobaba College of Engineering and ManagementNagpur -440013	Iss. No.: 01, Rev. No.: 00
Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC	Semester: V Section A & B Course Code: ECT352 Course Name: Control Systems	Page: 01/01
Programme: B. Tech	Test:1	Date of Exam: 03/10/2022
Max Marks: 15	Session: 2022-23	Time: 12 pm - 1 pm

Instructions: All questions are compulsory. Assume suitable data wherever needed.

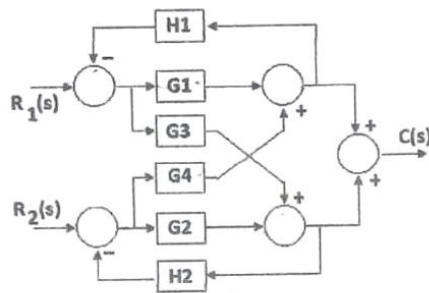| Question No.	Questions	Marks	CO	EO
1	Obtain the transfer function $C(s)/R_1(s)$ for the block diagram shown in Fig. 1 using block-reduction technique.	5	2	L2

Fig. 1

| 2 | Represent the following set of equations by a signal flow graph and determine the overall gain relating to x_5 and x_1 using Mason's gain formula. | 5 | 2 | L3 |

$$x_2 = ax_1 + fx_2 \quad ; \quad x_3 = bx_2 + ex_4$$
$$x_4 = cx_3 + hx_5 \quad ; \quad x_5 = dx_4 + gx_2$$

| 3 | A unity feedback control system has its open loop transfer function given by | 5 | 4 | L3 |

$$G(s) = \frac{(4s + 1)}{4s^2} \quad = \quad \frac{4s+1}{4s^2+4s+1} \quad = \quad \frac{s+0.25}{s^2+s+0.25}$$

Determine an expression for the time response c(t) when the system is subjected to

(a) unit impulse input function and $R(s) = 1 \Rightarrow e^{-0.5t}(1 - 0.25t)$

(b) unit step input function. $\left(\frac{1}{s}\right) \Rightarrow 1 - e^{-0.5t}(1 - 0.5t)$
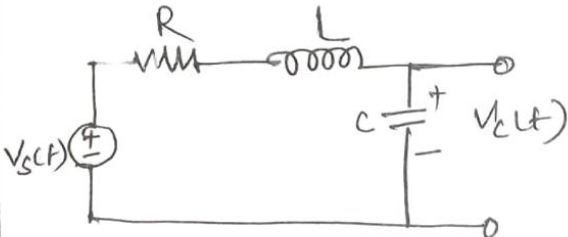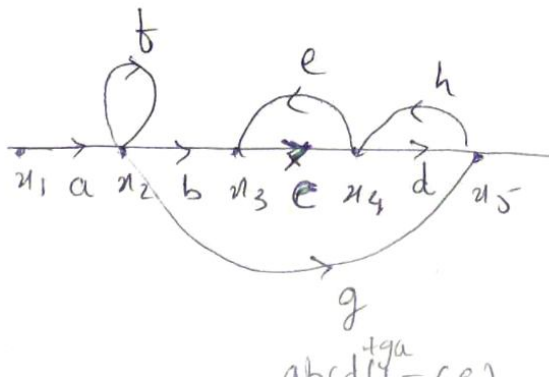
$$P_1 = abcd$$
$$P_2 = g(1 - ce)$$
$$P_{11} = ce$$
$$P_{12} = dh$$

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Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC	Semester : 5TH Section: A & B Course Code: ECT352 Course Name: **Control Systems**	Page: 01/01
Programme: B Tech	**Test: 2**	Date of Exam: 12/12/2022
Max Marks: 15	Session: 2022-23	Time: 12:00-1:00 PM

Instructions: All Questions are compulsory

Question No.	Questions	Marks	CO	EO
• 1	Determine the angle of departures of the root locus from complex poles of the open loop transfer function $$G(s) = \frac{K(S+1)}{S(S^2 + 2S + 4)}$$ $\theta = \pm 60$ $\Rightarrow -1+\sqrt{3}i, \; -1-\sqrt{3}i$	5	CO1,4	L5
2	Sketch the polar plot for the given function $$G(s) = \frac{K}{(S+1)(S+2)}$$	2	CO1,3,4	L3
• 3	The characteristics equation of a dynamic system is S6+4S5+5S4+11S3+22S2+110S+100=0. Determine the number of roots on the RHP, LHP and on the jω axis.	3	CO1,3	L5
4	For the electrical network shown in Fig.1 obtain state model in the phase variable form. Select the inductor current as one of the state variables. Fig. 1	3	CO1,3,5	L3
• 5	What is saturation non linearity	2	CO1	L1

Instructions: All questions are compulsory.

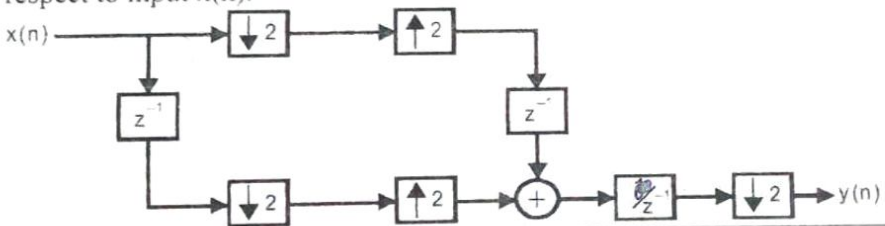| Question No.	Questions	Marks	CO	EO
1.	Illustrate addressing mode by writing a program for transferring 100bytes of data from code memory 500H to external RAM 1000H onwards. Note: Each instruction addressing mode is to be specified.	06	CO1,2	L3
2.	Evaluate mode 1 of timer by generating a square wave of 100Khz on pin P1.2. Assume Xtal of 24MHz. Show all the calculation, structure of timer register along with the program.	06	CO2,3	L4
3.	Considering External memory is interfaced with 8051, explain the significance of $\overline{PSEN}$, $\overline{EA}$/VPP, and ALE.	03	CO1	L2

Instructions: All questions are compulsory and carry the weight-age as indicated
Due marks will be given to neatness and presentation.

Question No.	Questions	Marks	CO	EO
Q1	Interface a LCD with 8051 and write a program to display a string "Hello WORLD" where "HELLO" is on line 1 and "WORLD" is on line 2.	5	3,4	L3
Q2	Elucidate the operating modes of ARM7TDMI with a detailed example.	5	1,4	L2
Q3	Consider the set of 5 processes whose arrival time and burst time are given below-	5	1,2,4	L4

Process ID	Arrival Time	Burst/Execution Time
P1	3	1
P2	1	4
P3	4	2
P4	0	6
P5	2	3

If the CPU scheduling policy is SJF non-preemptive, calculate the average waiting time and average turn around time.

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Ref. Clause(s): 9.1			Date of Rev: 01/01/2018
Department: EC	Semester : V Section: A and B Course Code: ECT354 Course Name: Digital Signal Processing		Page: 01/01
Programme:BE	Test: 1		Date of Exam: 06/10/2022
Max Marks: 15	Session: 2022-23	Time: 12:00 pm -1:00 pm	

	Instructions: All questions are compulsory. All the questions carry marks as indicated. Assume suitable data wherever necessary. Due credit will be given to neatness and figures.	Marks	COs	EOs
Q.1	A causal sequence is given by x(n) = {2, 1, 2, 1, 1, 2, 1, 2}. Evaluate 8-point DFT of x(n) by radix-2 DIF-FFT. Also sketch the magnitude and phase spectrum.	06	CO1	L3
Q.2	Reconstruct and plot the causal signal x(n) from its DFT shown below, Magnitude spectrum Phase spectrum	04	CO2	L5
Q.3	A digital filter having its system transfer function of the form as given below $$H(z) = \frac{0.1569 z^3 + 0.4706 z^2 + 0.4706 z + 0.1569}{z^3 - 0.0732 z^2 + 0.3348 z - 0.0067}$$ Design the direct form –I and II structure.	05	CO1	L6

$4.243\angle -0.75\pi$

$\dfrac{0.1569 + 0.4706\,z^{-1} + 0.470\,z^{-2} + 0.1569 z^{-3} + \cdots}{1 - 0.0732\,z^{-1} + 0 \cdots - 1}$

ACAD-27 a)		Iss. No.: 01, Rev. No.: 00
Ref. Clause(s): 9.1	Shri Ramdeobaba College of Engineering and Management, Nagpur -440013	Date of Rev: 01/01/2018
Department: EC	Semester : V Section: A and B Course Code: ECT354 Course Name: Digital Signal Processing	Page: 01/01
Programme: BE	Test: 2	Date of Exam: 14/12/2022
Max Marks: 15	Session: 2022-23	Time: 12:00 pm -1:00 pm

Instructions: Solve Q.1 OR Q.2 and remaining questions are compulsory. All the questions carry marks as indicated. Assume suitable data wherever necessary. Due credit will be given to neatness and figures.	Marks	COs	EOs
Q.1 ✓ Design a Butterworth digital IIR lowpass filter using impulse invariant transformation by taking T = 1second, to satisfy the following specifications. $0.45 \le |H(e^{j\omega})| \le 1.0$; $0 \le \omega \le 0.5\pi$ $|H(e^{j\omega})| \le 0.15$; $0.8\pi \le \omega \le \pi$ Also realize the optimum filter structure.	07	CO3	L6
OR			
Q.2 Design a FIR bandstop filter to reject frequencies in the range 2.5kHz to 3.8kHz having sampling frequency of 9kHz with 9 samples using Fourier series method. Determine the frequency response $H(e^{j\omega})$ and sketch the nature of magnitude response. Also realize the linear phase filter structure.	07	CO3	L6
Q.3 ✓ Evaluate the response y(n) as function of x(n) for a multirate system shown below and draw the conclusion about change in sample rate of y(n) with respect to input x(n).	04	CO4	L4
Q.4 ✓ Describe Super Harvard Architecture Single-Chip Computer (SHARC) Digital Signal Processor with block diagram. Summarize the advantage of Very Long Instruction Word (VLIW) architecture in DSPs.	04	CO5	L2

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Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC	Semester : V Course Code: ECT355-5 Course Name: Database Management Systems	Page: 01/01
Programme: B. Tech.	Test: 1	Date of Exam: 06/10/2022
Max Marks: 15	Session: 2022-23	Time: 1 Hr.

Instructions: All questions are compulsory.

Que. No.	Questions	Marks	CO	EO
1 (a)	Explain various Data Models of databases.	2	CO1	L1
1 (b)	Consider the two relations R1 and R2. Show the result of following operation- i) R1 ⋈ R2 ii) R1 ⋊ R2	3	CO1	L5
2 (a)	Evaluate canonical set attributes for the relation R (A,B,C,D,E) with functional dependencies F. F: $A \rightarrow B$, $C \rightarrow B$, $D \rightarrow ABC$, $A \rightarrow D$	3	CO1	L5
2 (b)	Consider a relation R(A,B,C,D,E) with functional dependencies F F: $CE \rightarrow D$, $D \rightarrow B$, $C \rightarrow A$ Determine candidate key.	2	CO1	L3
3	Consider the following relation- EMPLOYEE(Ename, Cname, Salary) LIVES(Ename, Street, City) LOCATED_IN(Cname, City) MANAGER(Ename, Mname) Where Ename= Employee name, Cname = Company name, Mname = Manager name. Write the SQL query for the following: i) Find the names of the Employee starting with letter 'S' and Salary who work for the company Infosys. ii) Find the names of the Employee who work for the company Wipro along with the city they live in. iii) Find the names of the Employee who live and work in the same city.	5	CO3	L5

For Question 1(b):

R1

B_name	Acc_no	bal
SBI	101	50
UCO	102	70
CBI	1004	110

R2

C_name	Acc_no
RR	1010
AS	1020
BK	1004
SS	1191

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Ref. Clause(s): 9.1		Date of Rev: 01/01/2018
Department: EC	Semester : V Course Code: ECT355-5 Course Name: Database Management Systems	Page: 01/01
Programme: B. Tech.	Test: 2	Date of Exam: 14/12/2022
Max Marks: 15	Session: 2022-23	Time: 1 Hr.

Instructions: All questions are compulsory.

Que. No.	Questions	Marks	CO	EO
1 (a)	Discuss various types of indexing in DBMS.	2	CO2	L2
1 (b)	What do you mean by linear hashing? Apply division method and open addressing technique to generate a hash structure for following sequence of search keys. Given that h(k) = 2k + 3 and m = 10 Search keys - -> 3, 2, 9, 6, 11, 13, 7, 12	5	CO2	L5
2	Explain query processing in DBMS.	3	CO1	L2
3(a)	Explain ACID property of transaction.	2	CO1	L2
3(b)	Explain deadlock. Discuss various approaches for deadlock prevention.	3	CO1	L2