NCU-FRM-29

	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd, III Session: (July-Dec)
	Programme: B-Tech Course Name: Field and Waves Course Code : ECL 205	Maximum Marks: 20 Duration: 1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Log tables/Steam table/IS Codes/Charts/Calculator/Reference books permitted.

Q1. Sate Ampere's Circuital Law and its applications.	4	CO2
Q2. Find out the expressions for propagation constant, attenuation constant, phase constant and intrinsic impedance for the case of wave propagation in free space.	6	CO3
Q3. In free space ($z<0$), a plane wave with $H = 20 \cos (10^6 t + \beta z)\, a_y$ A/m is incident normally on a lossless medium ($\varepsilon_r = 20$; $\mu_r = 1$) in region $z > 0$. Determine the reflected wave H_r E_r and the transmitted wave H_T, E_T.	6	CO3
Q4. A uniform plane wave propagating in a lossless medium has $E = 19 \text{ Sin } (10^8 t - \beta z)\, a_y$ V/m. If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 30$, and $\sigma = 10$ mhos/m, find α, β and H.	4	CO3

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II(Reappear)**	**Review Date**
	School of Engineering and Technology	**Semester: Ist Reappear (EEE)**
	Programme: B-Tech **Course Name: Basics of Electrical Engineering** **Course Code : EEL 101**	**Session: July-Dec 2016** **Maximum Marks: 20** **Duration :1 Hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks and Course Outcomes are indicated against the questions.

Q1. (a) The full wave rectified sine wave has a delay angle of 60 degrees. Calculate Vav and Vrms , if the peak voltage is 20V . (4) CO2

(b) Given a three-phase, 3-wire system with Y-connected load for which the line voltage is 220 V and impedance of each phase is (4+j8) ohms. Find the line current and power absorbed by each phase. (6) CO3

Q2. Derive the relationship between line voltage and phase voltage , line current and phase current for in three phase system with a) Star connected loads b) Delta connected loads (5) CO3

Q3. Define the form factor, crest factor, power triangle, impedance triangle and power factor. (5) CO2

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd/ III (FT)/VI(PT) Session: (July-Dec) 2016**
	Programme: M-Tech VLSI Design **Course Name: ASIC Design & Verification with SystemVerilog** **Course Code: ECL625** 19 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.

			Marks	CO
Q.1		For the following SystemVerilog code, i. what is displayed if the task my_task2() is automatic? ii. what is displayed if the task my_task2() is not automatic?	**6**	**CO3**

```
int new_address1, new_address2;
bit clk;
initial begin
  fork
     my_task2(21, new_address1);
     my_task2(20, new_address2);
  join
  $display("new_address1 = %0d", new_address1);
  $display("new_address2 = %0d", new_address2);
end

initial
  forever #50 clk = !clk;

 task my_task2(input int address, output int
new_address);
   @(clk);
   new_address = address;
 endtask
```

Q.2	**A**	Discuss the interface construct. Write sample SV Code for i. testbench using a simple arbiter interface ii. top module with a simple arbiter interface	**4**	**CO3**
	B	How can we group signals in an interface using Modports? Explain with SV Code, i. interface with modport ii. top level module with modports	**4**	**CO3**
Q.3	**A**	What is the timing problem in Verilog?	**2**	**CO4**
	B	Explain the Race condition between the testbench and design with help of a Sample Code.	**4**	**CO4**

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd/ III (FT)/VI(PT) Session: (July-Dec) 2016**
	Programme: M-Tech VLSI Design (Re-appear) **Course Name: Semiconductor Device Modeling & Technology** **Course Code: ECL525**	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator allowed.

19 OCT 2016

			Marks	CO
Q.1	**A**	What is Esaki Diode? Draw the energy band diagram of it under different bias conditions, i. thermal equilibrium ii. reverse bias iii. small forward bias resulting in tunneling of carriers iv. larger forward bias showing negative resistance effect.	**4**	**CO2**
	B	What is negative resistance effect in a Tunnel diode? Explain by drawing the I-V Characteristics of it. Why Tunnel Diodes are used in High Speed Circuits?	**4**	**CO2**
Q.2	**A**	What are the different current components in an npn transistor in the normal active mode of operation? Explain with the help of a neat diagram.	**4**	**CO4**
	B	Although Gallium is a group III element, why it is not commonly used as a p-type dopant in silicon?	**2**	**CO5**
Q.3		A metal-semiconductor Schottky diode fabricated on n-GaAs with $N_D=10^{16}cm^{-3}$ has a reverse saturation current density $Js=5x10^{-8}$ A/cm^2 at 300K. Calculate the barrier height and the depletion region width at thermal equilibrium assuming A** for n-n-GaAs to be $4.4A/K^2cm^2$	**6**	**CO3**

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd ECE-III** **Session: (July-Dec 2016)**
	Programme: B-Tech (ECE) **Course Name: Network Theory/Circuit Theory** **Course Code : EEL201/ ECL201**	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator permitted.

19 OCT 2016

Marks CO

Q1. For the network shown in Figure: 1, the switch is in position 'a' for a long time. At t=0, the switch is moved from 'a' to 'b'. Find $v_2(t)$. Assume that the initial current in the 2H inductor is zero. **5 CO3**

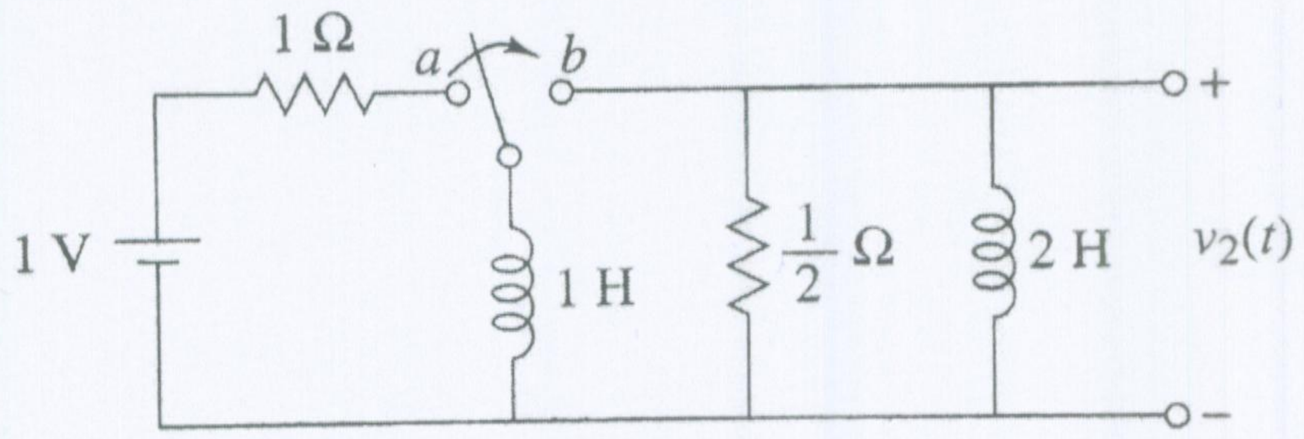

Figure: 1

Q2. Show the pole zero plot of the given network function $V(s)$ and obtain $v(t)$. **5 CO4**

$$V(s) = \frac{2s}{s^3 + 3s^2 + 6s + 4}$$

Q3. Obtain the transfer impedance for the circuit shown in Figure: 2. **5 CO4**

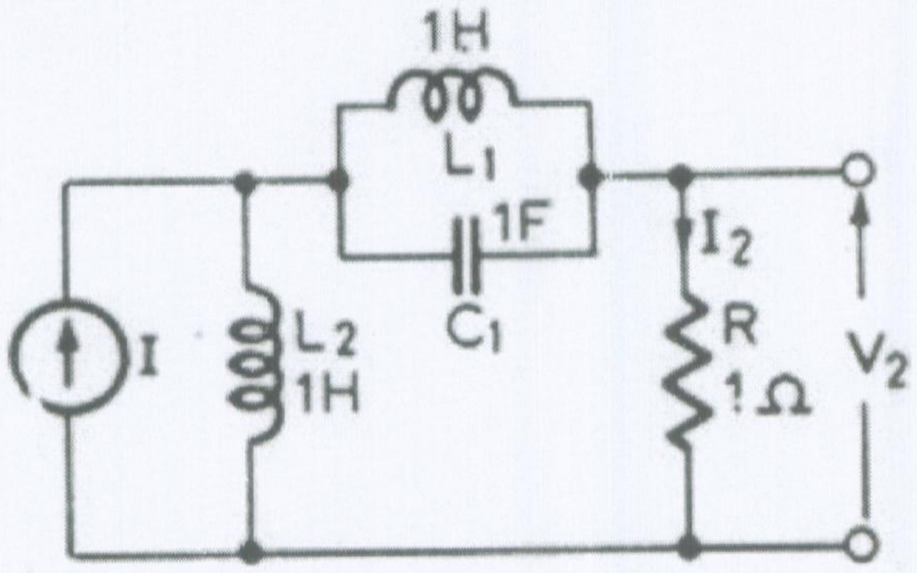

Figure: 2

Q4. An driving point impedance function is given by **5 CO4**

$$Z(s) = \frac{8s^4 + 32s^2 + 24}{s^5 + 6s^3 + 8s}$$

Check whether the given function LC or RC/RL. Realize the network in Foster-II and Caure-II form.

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd/ III (FT) Session: (July-Dec) 2016**
	Programme: M-Tech VLSI Design / Pre-PhD **Course Name: Low Power VLSI Design** **Course Code: ECL524** 19 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.

			Marks	CO
Q.1	**A**	What is Gate Reorganization in Low-Power Logic Design? Discuss the Local Transformation Operators for Gate Reorganization.	**4**	**CO1**
	B	What is Precomputation Logic in Synchronous Digital Logics? Explain with help of a Variant of a Precomputation logic.	**4**	**CO2**
Q.2		Design a Low-Power 10-Transistor Full Adder using XOR and XNOR Gates. Verify its operation using truth-tables.	**4**	**CO2**
Q.3	**A**	Discuss the Architecture of the 4x4 Low-Power Baugh-Wooley Multipliers Algorithm.	**4**	**CO3**
	B	Explain and compare the different multiplier architectures, Serial, Parallel and Serial-Parallel Multipliers on the basis of Low-Voltage and Low-Power demands.	**4**	**CO3**

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd/ I (FT)** **Session: (July-Dec) 2016**
	Programme: M-Tech VLSI Design / ECE **Course Name: Digital VLSI Design** **Course Code: ECL523** 19 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.

			Marks	**CO**
Q.1	**A**	Explain the process flow for the fabrication of a n-type MOSFET on p-type Silicon.	**4**	**CO1**
	B	What are the layout design rules? How the Micron and Lambda rules are different?	**3**	**CO1**
Q.2	**A**	Why PTL is preferred in logic design? What is the main challenge of PTL?	**3**	**CO3** **CO4**
	B	Design a 2-input multiplexer circuit using two CMOS Transmission Gates.	**3**	**CO3**
Q.3	**A**	Discuss the operation of DRAM and SRAM. Why DRAMs are preferred in main memory in place of SRAMs in volatile memories?	**3**	**CO5**
	B	What are the Small Geometry Effects in MOSFET Scaling? Derive/Write the parameters after Full and Constant Field Scaling, i. Oxide Capacitance (C_{ox}) ii. Drain Current (I_D) iii. Power Dissipation (P) iv. Power Density (P/Area)	**4**	**CO4**

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd/ V Session: (July-Dec)2016
	Programme: B-Tech ECE Course Name: Microprocessor and its application Course Code : ECL330 19 OCT 2016	Maximum Marks: 20 Duration :1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Each question carry four marks

Q1.Discuss in detail the segmentation of memory in 8086. CO3

Q2. Explain the function of following signals of 8086 CO2
(i) $\overline{TEST}$
(ii) MN/MX
(iii) $\overline{QS_0}$ AND QS_1
(iv) $\overline{DEN}$

Q3 Write an assembly language program in 8086 to copy word DADA into 4K memory locations from 70000H. CO4

Q4. Explain the SIM instruction and write a program to reset 7.5 interrupts in 8085 system. CO2

Q5. Write an assembly language program to count the even and odd numbers from the series of 100 numbers present in memory location from 2000:0100H. Store the even count in register BX and odd count in register DX. CO4

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd, III Session: (July-Dec)2016
	Programme: B-Tech Course Name: Field and Waves Course Code : ECL 205 19 OCT 2016	Maximum Marks: 20 Duration: 1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

Q1. Sate Biot-Savart's Law and its applications.	4	CO2
Q2. Find out the expressions for propagation constant, attenuation constant, phase constant and intrinsic impedance for the case of wave propagation in lossy dielectrics.	6	CO3
Q3. In free space ($z<0$), a plane wave with $H = 10 \cos (10^6 t - \beta z)\, a_y$ A/m is incident normally on a lossless medium ($e = 4\varepsilon_o$; $\mu = 6\mu_o$) in region $z > 0$. Determine the reflected wave H_r E_r and the transmitted wave H_T, E_T.	6	CO3
Q4. A uniform plane wave propagating in a medium has $E = 9\, e^{-\alpha z} \text{Sin}\, (10^5 t + \beta z)\, a_y$ V/m. If the medium is characterized by $\varepsilon_r = 1$, $\mu_r = 30$, and $\sigma = 10$ mhos/m, find α, β and H.	4	CO3

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd/III CSE**
	Programme: B.Tech **Course Name: Digital Electronics** **Course Code : ECL 200** 18 OCT 2016	**Session: (July-Dec) 2016** **Maximum Marks:20** **Duration :1hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks and Cos are indicated against the questions.

Q.1 Consider two cascaded 2:1 multiplexers as shown in Fig. 1, find the minimal sum of products form of the output X. CO3 4

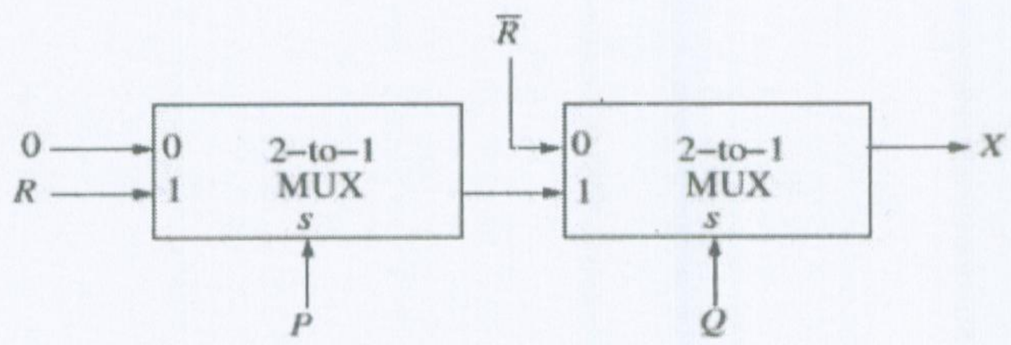

Fig. 1

Q. 2 Design the priority encoder circuit for the order of priority mentioned in Fig.2. CO3 4

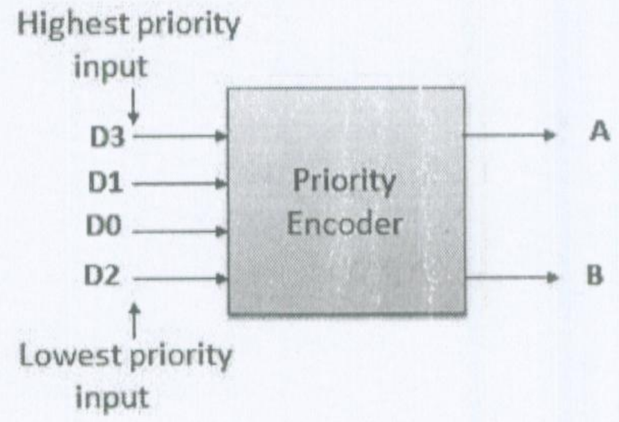

Fig. 2

Q.3 Design a circuit to multiply two 2-bit numbers - a, b and c, d and produce a 4-bit product - w, x, y, z. Use decoder and four NAND gates to implement this circuit. CO3 4

Q.4 Convert JK flip-flop to D flip-flop. CO4 4

Q.5 Consider the partial implementation of a 2-bit counter using T flip-flops following the sequence 0-2-3-1-0, as shown in Fig. 3. To complete the circuit, the input X should be CO4 4

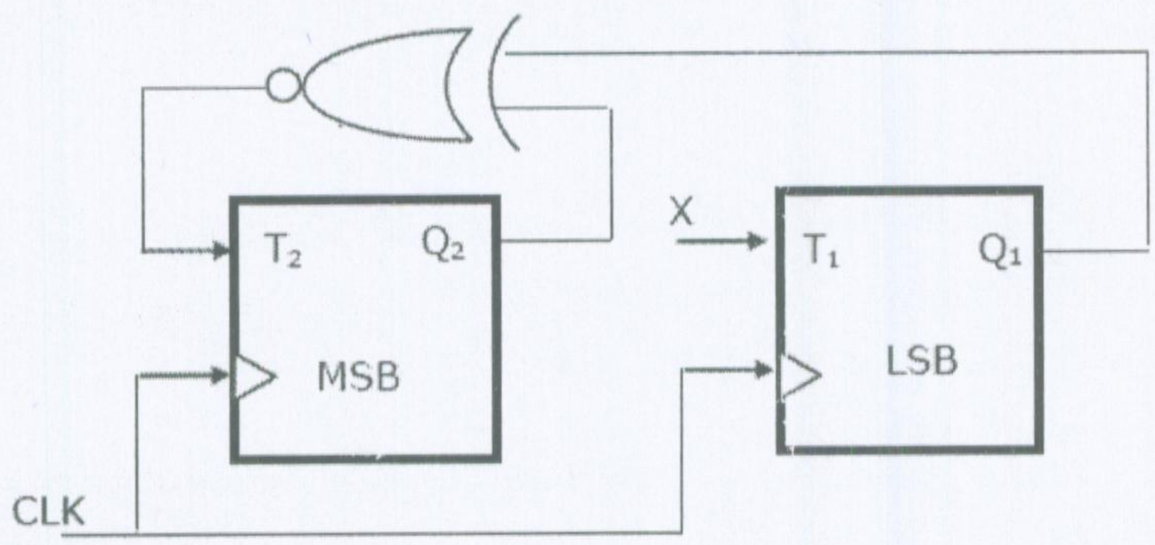

Fig. 3

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd Session: (July-Dec)2016
	Programme: M-Tech EC/ I sem Course Name: Information Theory and Coding Course Code : ECL 517	Maximum Marks:20 Duration :1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

18 OCT 2016

Marks/CO

Q1. For a systematic linear block code, the three parity check digits are given by

$$\left.\begin{aligned} C_4 &= d_1 \oplus d_2 \oplus d_3 \\ C_5 &= d_1 \oplus d_2 \\ C_6 &= d_1 \oplus d_3 \end{aligned}\right\}$$

10 /CO4

i) Construct generator matrix.
ii) Construct code generated by this matrix.
iii) Determine error correction capability.
iv) Prepare a suitable decoding table.
v) Decode the received words 101100 and 000110.

Q2. Find out the generator matrix for a systematic (7,4) cyclic code if G(p) is given as:

$$G(p) = p^3 + p + 1.$$

5 /CO5

Also find out the parity check matrix.

Q3. Consider a binary code C = {11100, 01001, 10010, 00111}.
i) Compute the minimum distance of C.
ii) Decode the words 10000, 01100, and 00100 using minimum distance decoding

5 /CO5

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd I Sem** **Session: (July-Dec)2016**
	Programme: B.Tech **Course Name: Basics of Electrical and Electronics Engineering** **Course Code : ECL110**	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Use of Calculator is permitted.

18 OCT 2016

	COs	Marks
Q1 Find the average and rms value for the wave shapes if the curves are parts of a sine wave shown in Fig 1	CO2	5

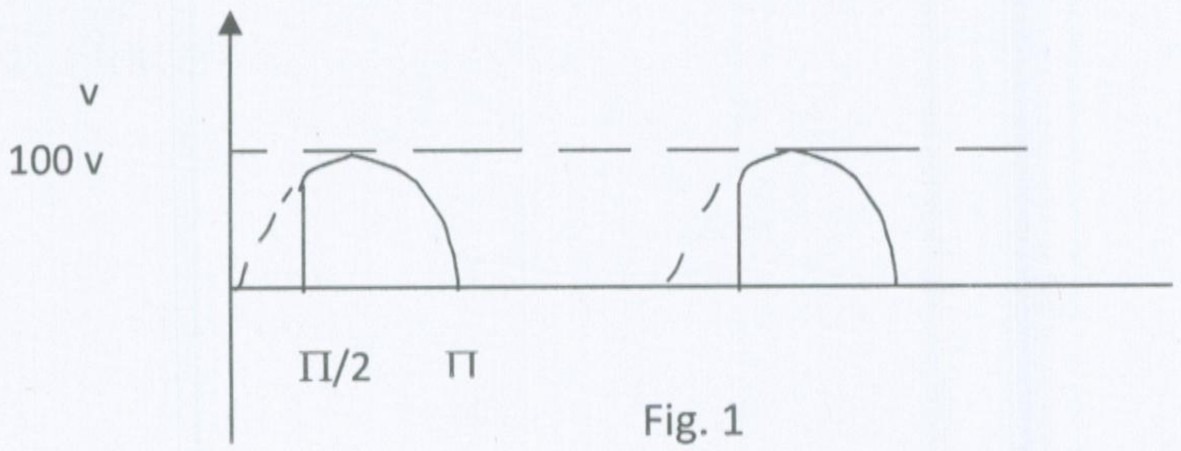

Fig. 1

Q2. a) Determine the r.m.s value of voltage defined by E= 5+5sin(314 t+pi/6)	CO2	5
b). Explain the working of a bridge rectifier with neat diagrams. Derive the expressions for average value ,rms value, peak inverse voltage and ripple factor.	CO3	5
Q3. The circuit components shown in Fig.2 are connected to an AC voltage source with amplitude of 25 V and frequency 50 Hz. Determine the amplitude of electric current in the circuit and a phase difference between the voltage and the current.	CO2	5

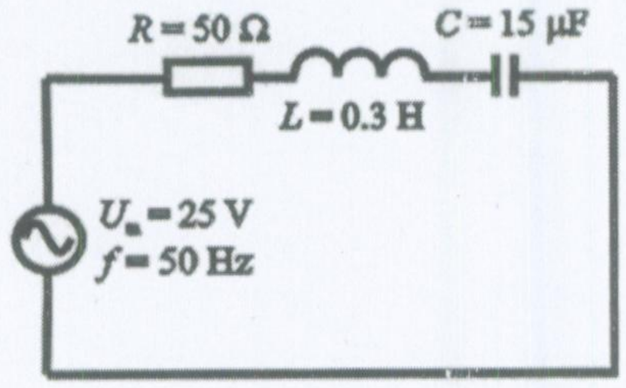

Fig. 2

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd III** **Session: (July-Dec)2016**
	Programme: B-Tech **Course Name: ANALOG ELECTRONICS** **Course Code :ECL-203** 18 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

		Marks	CO
Q.1	a) Why the gain of multistage amplifier falls at high frequencies?	2.5	C01,
	b) Draw the complete hybrid ac equivalent model of BJT in CB configuration.	2.5	C02
Q.2	What is the effect of bypass capacitor C_E on voltage gain, input resistance and output resistance of fixed bias with emitter resistor bias circuit. Explain by deriving the expressions.	05	C01, C02
Q.3	Determine the voltage gain, input resistance, output resistance and current gain of following circuits		
	a) Voltage divider circuit without bypass capacitor with R1= 22K Ω, R2= 2.2K Ω, Rc= 1.6k Ω,Re= 100 Ω, hfe= 100,Vcc=15 V, C1=C2= 0.1 uF. Use re model for ac analysis.	05	C01
	b) Darlington pair based emitter follower given in the figure 1with R1= 10K Ω, R2= 5 K Ω, Re= 1K Ω, Vcc=12 V, C1=C2= 0.1 uF, hfe= 120, hoe= 25uS, hre= 2.5 *10^{-4} and hie= 50 Ω. The BJT shown in the Figure1 is composite transistor representing darlington pair with β_D 8000 and Vbe= 1.6 V.Use approximate hybrid model for calculations.	05	C01, C02

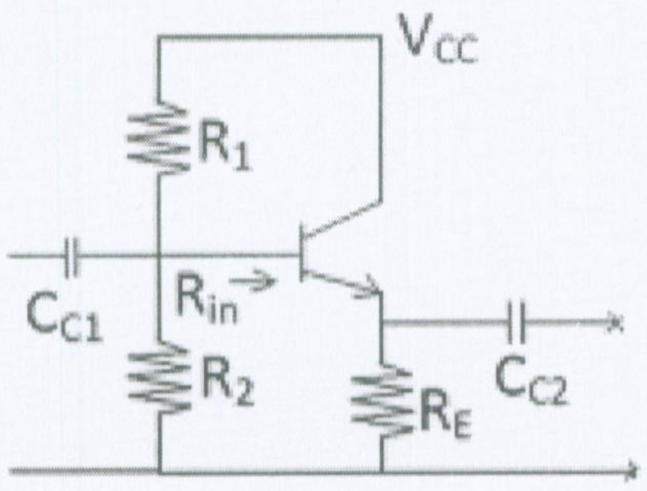

Figure 1

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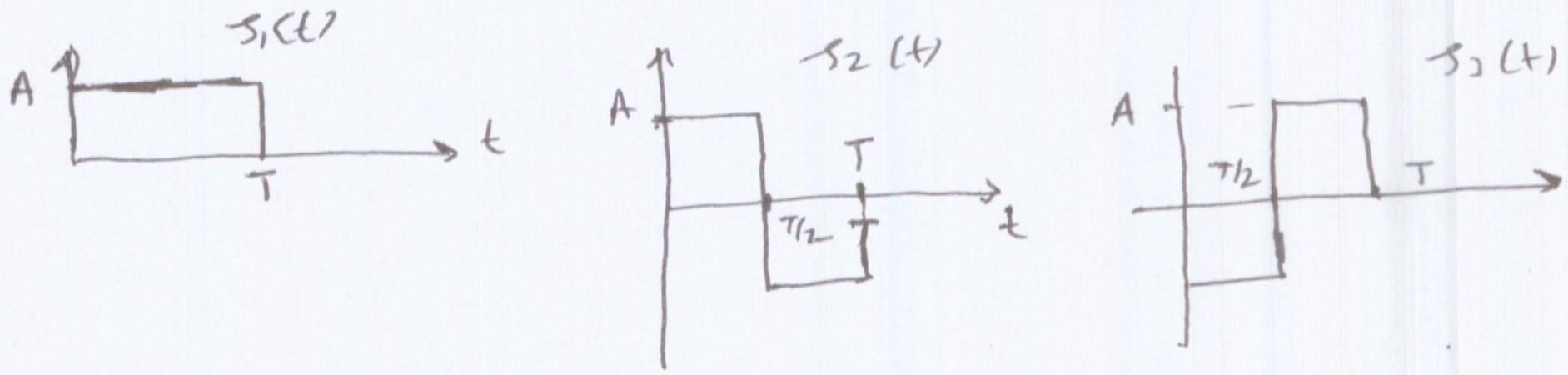
NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd I** **Session: (Jan-May) 2016**
	Programme: M.Tech **Course Name: Advanced Digital Communication** **Course Code : ECL 505** 18 OCT 2016	**Maximum Marks:20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. **This Question paper consists of 5 questions. Attempt all questions.**
2. Give precise and brief answers.
3. Please write question number on your answer sheet according to question paper.

Q.1. What do you understand by (i) Energy Signals and Power Signals (ii) Causal and Non Causal signals (iii) Deterministic and Random signals (iv) Even and Odd Symmetry signals. Give at least one example of each. **(5)** **CO-2**

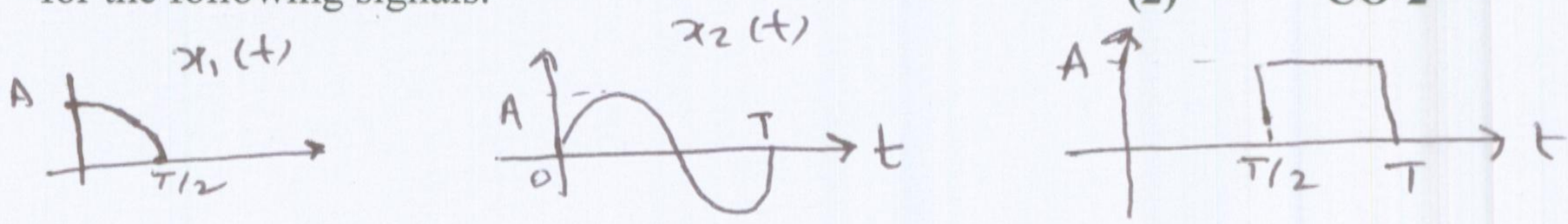
Q.2 What do you understand by linearly independent vectors? Find the Orthonormal Basis functions for the following set of signals. What is GSO& give its first few steps.

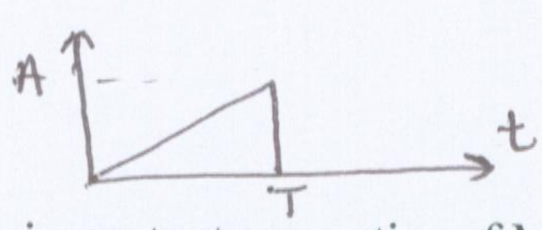
(5) **CO-2**



Q.3 What are optimum receivers. What do understand by the term "Sufficient Statistics" Show that for a signal corrupted by AWGN, correlation receiver is an optimum receiver. Make suitable assumptions. **(5)** **CO-1+CO-2**

Q.4 What are Matched filters. Give the impulse responses (matched filters waveforms) for the following signals. **(2)** **CO-2**





Q.5 What are the important properties of Matched filters. Prove that a Matched Filter maximizes output signal to noise ratio. **(3)** **CO-2**

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	School of Engineering and Technology	**Semester: V Odd**
	Programme: B.Tech (EEE) **Course Name: Power System-1** **Course Code : EEL303** 18 OCT 2016	**Session: July-Dec 2016** **Maximum Marks: 20** **Duration: 1hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory
2. Marks are indicated against the questions.
3. Calculator is permitted.

	COs	Marks
Q1. Derive the ABCD matrix for long transmission line.	CO3	5
Q2. Derive the expression for complex power flow through the transmission line.	CO3	5
Q3. Prove that the voltage and the current waves in a lossless power transmission line travels with the speed of light.	CO4	5
Q4. Write a short note on underground cables for power transmission.	CO4	5

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering and Technology	**Semester: Odd I** **Session: (July-Dec)2016**
	Programme: B-Tech **Course Name: Basic Electronics Engineering** **Course Code : ECL 101** 18 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory. 2. Marks are indicated against the questions. 3. Calculator is permitted. 4. All questions are from CO3.

Q.1 In a half wave rectifier circuit having a diode and load resistance, R_L= 1K**Ω**, an input of $V = 10 \sin \omega t$ is applied. Assume the diode as ideal one. Marks

(a) Derive an expression for efficiency of this rectifier. 3

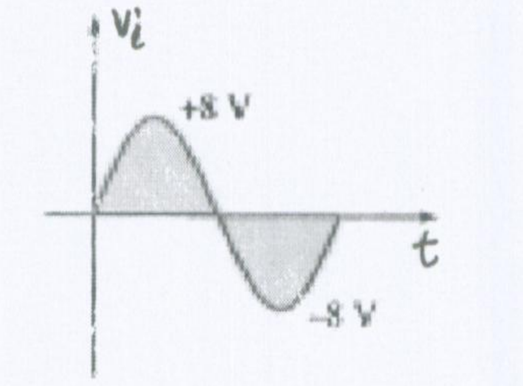
(b) Find the following parameters: 4
(i) DC output voltage
(ii) DC output current
(iii) RMS voltage
(iv) RMS current

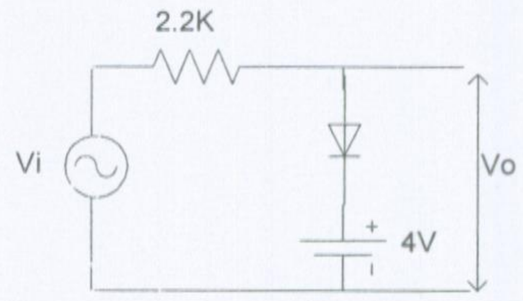
Q.2

(a) What is the difference between diffusion current and drift current in PN junction diode? 2

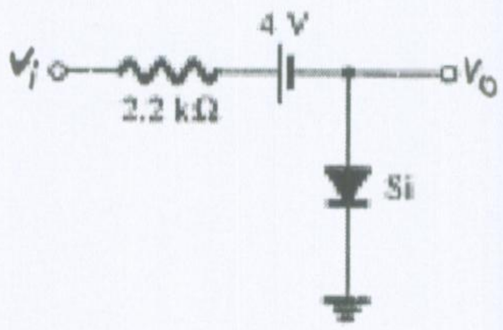
(b) Draw equivalent models for ideal and approximate semiconductor diode and explain the I-V characteristics for each model. 6

Q. 3 Determine the output voltage v_o for network (a) and (b) of Fig.1 for the sinusoidal input shown. Assume Si-diode as ideal one. 5





(a)



(b)

Fig. 1

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II**	**Review Date**
	School of Engineering and Technology	**Semester: Odd** **VII (EEE)** **Session: July-Dec 2016**
	Programme: B-Tech **Course Name: Power System Protection and Switchgear** **Course Code : EEL 403** 17 OCT 2016	**Maximum Marks: 20** **Duration :1 Hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks and Course Outcomes are indicated against the questions.
3. Calculator is allowed.

Q1. Draw and explain the connection diagram of MHO relay. Also explain the characteristics and construction of any one type of MHO relay with neat diagram. (8) CO3

Q2. (a) Explain the plain break oil circuit breaker with neat diagram. How the voltage distribution is equalized across the breaks during the fault in the line? (5) CO3

(b) For a 220 kV system the reactance and the capacitance up to the location of circuit breaker is 6 Ω and 0 .025 μF respectively. Calculate the following: (3) CO3

i) The frequency of transient oscillations
ii) Maximum value of restriking voltage across the circuit breaker contacts
iii) Maximum value of rate of rise of restriking voltage

Q3. Write the short note on the following: (4) CO3

a) Arc interruption methods in circuit breaker
b) IDMT relay

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering and Technology	**Semester: Odd VII** **Session: (July-Dec) 2016**
	Programme: B-Tech **Course Name: Power Station Engineering** **Course Code : EEL300** 2 17 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Use of calculator is permitted.

Q 1 Enumerate the advantages and disadvantages of hydro power plants over **CO1 4**
a) thermal power plants b) nuclear power plants

Q 2 In a particular area both steam and hydro stations are equally possible. It has been estimated **CO4 8**
that the capital costs and running costs of these two types will be as under :

Plant	*Capital cost/kW*	*Running cost/kWh*	*Interest*
Hydro	Rs 3000	3 paise	5%
Steam	Rs 2000	10 paise	5%

If the expected average load factor is 40%, which is economical to operate, steam or hydro ?

Q 3.The following data for the monthly mean discharge of a hydroelectric power plant is given below. **CO1 8**
CO3
a) Draw the hydrograph and find the mean flow.
b) Find the power developed if the head available is 90m and the overall efficiency of the generation is 80%. Assume each month of 30 days.

Month	*Mean Discharge (millions cu.m.)*	*Month*	*Mean Discharge (millions cu.m.)*
Jan	25	July	100
Feb	20	Aug	110
Mar	10	Sept	80
Apr	0	Oct	65
May	30	Nov	50
June	45	Dec	30

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd VII Session: (July-Dec) 2016**
	Programme: B.Tech **Course Name: Optical Communication** **Course Code : ECL 402** 17 OCT 2016	**Maximum Marks:20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

Q1. i)	An uncoated Gallium Arsenide (GaAs) injection diode laser with a cavity length of 500 μm has a loss coefficient of $20cm^{-1}$. The measured differential external quantum efficiency of the device is 45%. Calculate the internal quantum efficiency of the laser. Assume the refractive index of GaAs is 3.6.	04 CO2
ii)	A planar LED is fabricated from gallium arsenide which has a refractive index of 4.5. (a) Calculate the optical power emitted into air as a percentage of the internal optical power for the device when the transmission factor at the crystal –air interface is 0.60. (b) when the optical power generated internally is 45% of the electrical power supplied , determine the external power efficiency.	04 CO2
Q2. i)	A DH surface emitter which has an emission area diameter of 50 μm is butt jointed to an 80 μm core step index fiber with a numerical aperture of 0.15. The device has a radiance of 30W $sr^{-1}cm^{-2}$ at a constant operating drive current .Estimate the optical power coupled into the fiber if it is assumed that the Fresnel reflection coefficient at the index matched fiber surface is 0.01.	03 CO2
ii)	What happens when an electron in the conduction band is accelerated to energy above the bottom of the conduction band which is larger than the separation in energy between the bottom of the direct conduction band and the bottom of the indirect conduction band in a direct band gap semiconductor?	03 CO2
Q3.	Explain the process how an optical multiplexer is used to create the packet-interleaved TDM stream to extract one of the multiplexed channels from packet-interleaved TDM stream in Optical Time Division Multiplexing.	06 CO4

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II**	**Review date:**
	School of Engineering	**Semester: Odd V** **Session: (July-Dec 2016)**
	Programme: B.Tech **Course Name: Control System-1** **Course Code : EEL-301** 17 OCT 2016	**Maximum Marks:20** **Duration :1.0 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3.Calculators are allowed

	COs	Marks
Q1: Draw root locus plot of the feedback system with $$G(s)H(s)=\frac{K}{s(s^2+4s+13)}$$ Comment on Stability of the system.	CO4	8
Q2: Draw the Bode plot for the transfer function given below and from the plot determine: 1) Phase cross over frequency 2) Gain cross over frequency 3) Phase margin 4) Gain margin 5) Stability of the system $$G(s)H(s)=\frac{16(1+0.5s)}{s^2(1+0.125s)(1+0.1s)}$$	CO4	8
Q3: Using the Routh's stability criterion, determine condition on K_a, T_1 and T_2 so the system having open loop transfer function: $$G(s)H(s)=\frac{K_a(2+sT_1)}{s^2(1+sT_2)}$$ is stable.	CO3	4

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd V** **Session: (July-Dec)2016**
	Programme: B-Tech **Course Name: Digital Communication Systems** **Course Code : ECL 303**	**Maximum Marks: 20** **Duration :1hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

17 OCT 2016

Q1) For the input binary sequence {1,1,0,1,0,0,1,0}. Find the transmitted phase and sketch the transmitted waveforms for I channel, Q channel and QPSK output. (CO3) 3

Q2) Explain coherent carrier recovery and show its use in BPSK demodulation process. Draw the block diagram of demodulator and calculate the binary output received if the input at the demodulator is $-\sin\omega_c t$. (CO3) 4

Q3) Binary data is transmitted over an AWGN channel. The carrier amplitude at the receiver is 1mV. Noise power spectral density N_o is 2×10^{-15} W/Hz. Find the probability of error a) if BPSK is used b) if DPSK is used. Draw some conclusion with the results obtained. (CO4) 4

Q4) Determine the expression for bandwidth of an FSK system and compare it with FM system. For a binary data with input bit rate of 10kbps. mark and space frequency of 102 Khz and 98 Khz respectively, calculate the bandwidth and the baud. (CO3) 4

Q5) Draw the constellation diagrams of 16-PSK and 16-QAM. Which modulation scheme is preferred and why? Calculate the Euclidean distance 'd' between two points for both the schemes. Make suitable assumptions. (CO4) 5

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd VII** **Session: July-Dec , 2016**
	Programme: B.Tech. (Reappear) **Course Name: Satellite Communication** **Course Code : ECL 428** 17 OCT 2016	**Maximum Marks: 20** **Duration : 1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Scientific Calculator is permitted.

Q1. Define the attitude of a satellite. Explain how the attitude of a satellite is maintained?	4	CO2
Q2. A 20m antenna gives a certain uplink gain at 4/6GHz. Calculate the antenna size required for getting the same gain in 12/14 GHz band.	4	CO3
Q3. What is a satellite image and explain its significance.	4	CO4
Q4. Define satellite graveyards?	4	CO3
Q5. A satellite of mass 500 kg is placed in an orbit of radius 5 times the radius of the Earth, i.e. the distance between the satellite and the center of the Earth is equal to 5 Earth radii. Calculate the centripetal force experienced by the satellite. The radius of the Earth is 6400km.	4	CO4

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: III** **Session: (July-Dec)2016**
	Programme: M-Tech **Course Name: Telecom System & Technology** **Course Code : ECL 653** 17 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator permitted.

Q1.			
a)	Why networks using cut through switches have lower performance than those using store and forward switches?	CO3	5
b)	Differentiate between physical layer broadcast and MAC layer broadcast.		
Q2.	What do mean by network topology? Differentiate between Ring and star topology.	CO3	5
Q3.	In a digital CW communication system, the bit rate of NRZ data stream is 10 Mbps and carrier frequency is 100 MHz. What is the symbol rate of transmission and bandwidth required of the channel in the following cases of different techniques used?	CO4	5
a)	BPSK		
b)	8 PSK		
c)	32 ary PSK system		
Q4.			
a)	Why backbone networks use Asynchronous transfer mode? Which switching technique does it use?	C04	5
b)	" In channel switching is better than the common channel switching" justify the comment.		

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: III** **Session: (July-Dec)2016**
	Programme: M-Tech **Course Name: Advanced Processors** **Course Code : ECL 503**	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

Q1.			
	a) How does DX, SX and EX versions of operations of 80386 differ from each other?	CO3	5
	b) Complex instruction set computers have the following advantages over Reduced instruction set computers i. Small code size ii. High cycles per second iii. Memory to memory incorporated instructions Explain how these features are incorporated in CISC architecture?	CO3	5
Q2.	Elaborate how memory paging is implemented in Pentium architecture with example?	CO4	5
Q3.			
	a) Differentiate between interrupt and polling mechanism in detail b) Write a program to generate a square wave at P1.2 using timer-0.	CO4	5
Q4.			
	a) How does TMOD and TCON registers control the operation of timer unit of 8051? b) What are debug and test registers in 80386?		

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd VII
	Programme: B-Tech Course Name: Digital Signal Processing Course Code : ECL 350 17 OCT 2016	Session: (July-Dec)2016 Maximum Marks: 20 Duration :1hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

Q1) A length -8 sequence is given by x(n) = [-4, 5, 2, -3, 0, -2, 3, 4] with DFT given by X(k). Without computing the IDFT, determine the sequence y(n) whose DFT is given by W_4^{3k} X(k). (CO2) 3

Q2) Using DIT-FFT determine 8-point DFT of the following sequence (CO2) 5

$$x(n) = \begin{cases} 1, & 0 \le n \le 5 \\ 0, & elsewhere \end{cases}$$

Q3) Find the linear convolution of two sequences {1, 2, 2, 1} and {1, 2, 3} using circular convolution method. (CO3) 4
↑ ↑

Q4) A discrete system is represented by the following difference equation (CO3) 5

$$y(n) = 0.5y(n-1) - 0.4y(n-2) + x(n) + 0.3x(n-1)$$

Determine its parallel structure realization.

Q5) Compute x(n) for the given DFT X(k) = [2, 1+j, 0, 1-J]. Use the matrix method. (CO2) 3

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd IV** **Session: (July-Dec)2016**
	Programme: B.Tech. ECE **Course Name: Microwave and Radar Engineering** **Course Code : ECL403**	**Maximum Marks:20** **Duration :1:00 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Log tables/Calculator permitted.

17 OCT 2016

Q1. Explain how does bunching occur in reflex klystron? 5 CO3

Q2. What are the properties of ferrite devices? Explain any one ferrite device in details. 5 CO2

Q3. Why is S-matrix used in microwave analysis? What are the properties of scattering matrix for a lossless junction? Formulate the S-matrix for E plane tee. 5 CO1

Q4. A two-cavity klystron amplifier has the following parameters: 5 CO1

V_0= 1000 V, I_0= 25 mA, R_0= 40 kΩ, f = 3 GHz, X=1.841
Gap spacing in either cavity: d = 1 mm
Spacing between the two cavities: L = 4cm
Effective shunt impedance, excluding beam loading: R_{sh} = 30 kΩ

Find out:

a) The electron velocity just leaving the cathode.
b) The gap transit angle
c) The beam-coupling coefficient
d) The de transit angle between the cavities
e) The maximum input voltage V_1

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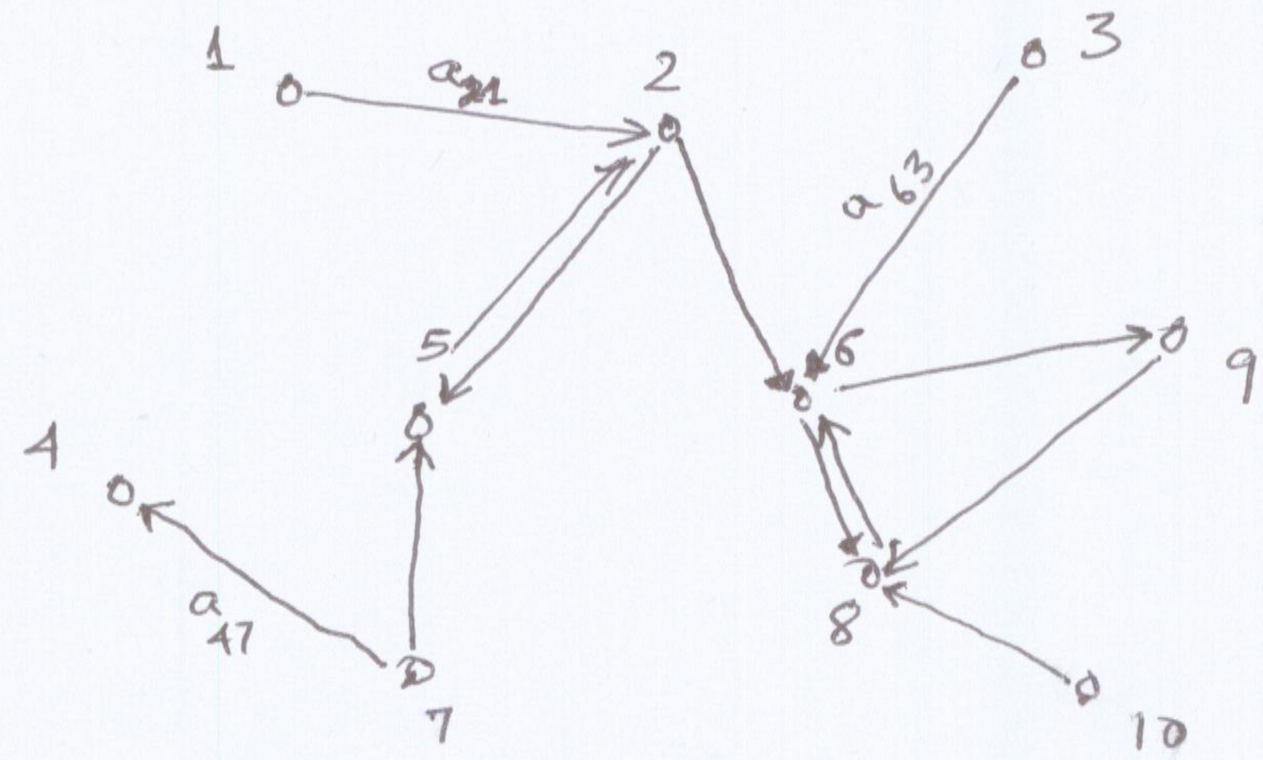
NCU THE NORTHCAP UNIVERSITY	**Minor Test II**	**Review Date:**
	School of Engineering	**Semester: Odd III** **Session: (Jan-May) 2016**
	Programme: M.Tech/ Pre- Ph.D **Course Name: Mobile Computing** **Course Code : ECL 611** 15 OCT 2016	**Maximum Marks:20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. **This Question paper consists of 5 questions. Attempt all questions.**
2. Give precise and brief answers.
3. Please write question number on your answer sheet according to question paper.

Q.1. What is the relationship between networks and graphs? What are directed and undirected graphs? Give the adjacency matrix for the following network.

(4) CO2 + CO3



Q.2 Explain the meaning of (i) Static and Dynamic routing" (ii) Flooding and Broadcasting" (iii) IGP and BGP in the context of routing. What are various metrics used in routing.

(4) CO2 +CO3

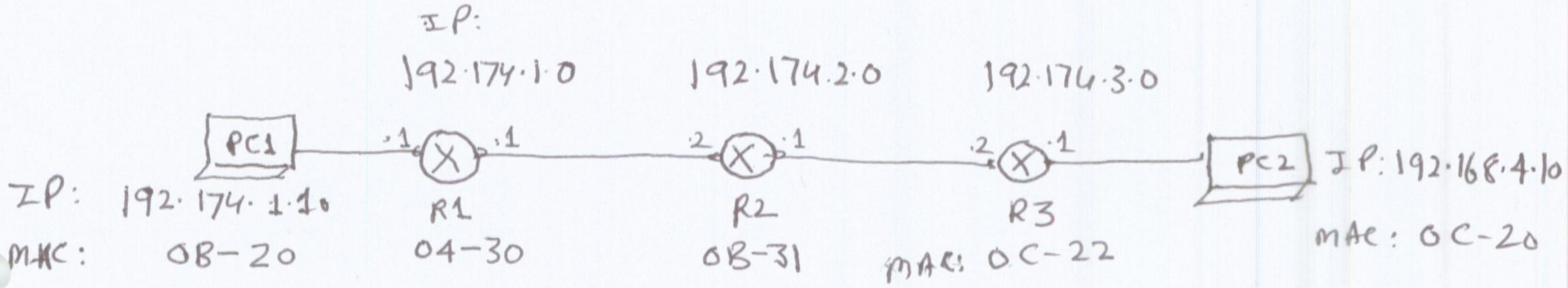
Q.3 A company applies for IP addresses and is given a block of addresses with starting classless address as 162.38.82.128 / 24. How many addresses are available to the company. The company needs to have 2 sub blocks of these addresses to use in two depts. with Block 1 of 20 addresses and Block 2 of 60 addresses. Design these sub blocks giving their start, end address with prefixes also.

(4) CO2+CO3

Q.4 a) Given an IPv6 address below. Write it in condensed form

3FFE:80F0:0002:0000:0000:0010:0000:0000

b) For the network below the packet destination is PC2 from source PC1. Give the frame structure filling only MAC address and IP address fields for (i) Frame reaching R1 from PC1 (ii) Frame leaving R3 going to PC2 **(4) CO2+CO3**



Q.5 What are the differences between Distance Vector and Link State Protocols. Give the salient features of either RIP or OSPF protocol. **(4) CO2+ CO3**

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II**	**Review Date:**
	School of Engineering and Technology	**Semester: I/II**
	Programme: Pre-Ph.D **Course Name: Electric Drives** 15 OCT 2016 **Course Code : EEL710**	**Session: July-Dec 2016**
		Maximum Marks: 20 **Duration: 1hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory
2. Marks are indicated against the questions.
3. Calculator is permitted.

	COs	Marks
Q1. Explain Phase-Locked-Loop control for speed regulation of electric drive	CO1	5
Q2. A constant speed drive has the following duty cycle: (i) Load rising from 0 to 400 kW in 5 minutes (ii) Uniform load of 500 kW in 5 minutes (iii) Regenerative power of 400 kW returned to the supply in 4 minutes (iv) Remains idle for 2 minutes. Assuming losses to be proportional to square of power, estimate power rating of electric motor.	CO1	5
Q3. A 200V, 200A, 800rpm dc separately excited motor has an armature resistance of 0.06 ohms. The motor armature is fed from a variable voltage source with an internal resistance of 0.04 ohms. Calculate internal voltage of the variable voltage source when the motor is operating in regenerative braking at 80% of the rated motor torque and 600 rpm various types of load and their speed-torque characteristics.	CO2	5
Q4. Explain the working of single-phase fully-controlled rectifier fed DC separately excited motor.	CO2	5

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II Reappear**	**Review Date:**
	School of Engineering	**Semester: III** **Session: (July-Dec)2016**
	Programme: B-Tech **Course Name: Principles of Communication** **Course Code : ECL 210** 15 OCT 2016	**Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator permitted.

Q1.

a) What do you mean by modulation index? Sketch amplitude modulated signal for a system having modulation index as — 4 — CO3

i. 0.8

ii. 1.2

b) What is vestigial side band (VSB) modulation and how it differs from single side band (SSB) modulation? — 4 — CO3

Q2.

a) Derive expression of output of Amplitude modulated signal and also draw its spectrum. — 4 — CO3

b) What percentage of total power is there in side bands and carrier in amplitude modulated output? — 4

Q3. Using Basel function give expression for output of frequency modulated signal. — 4 — C04

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester:5th ECE/EEE Session: July-Dec 2016
	Programme: B-Tech Course Name: Integrated circuit and its applications Course Code :ECL305	Maximum Marks:20 Duration :1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3. Calculator is permitted.

15 OCT 2016

		CO	Marks
Q1.	For the instrumentation amplifier shown in Figure No.1 find the output V_O as a function of V_1 and V_2.	CO3	6

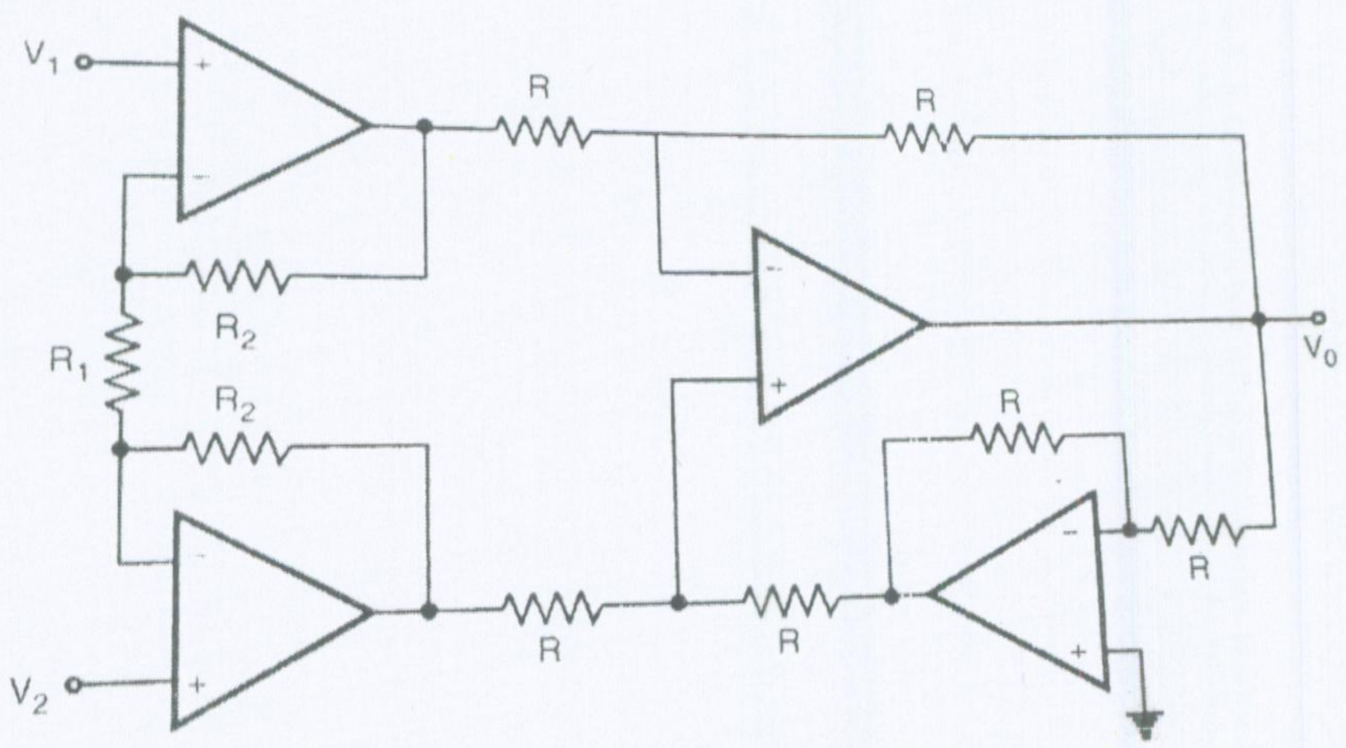

Figure No. 1

Q2.	Design an op-amp Schmitt trigger circuit with UTP= 2V and LTP= 1V and supply voltages of ±15V and V_{sat} = ±12V.	CO4	4
Q3.	Design a practical integrator to properly process an input sinusoidal waveform up to 2 kHz with amplitude 10 mV. Also draw input-output waveforms.	CO4	4
Q4.	a) Derive the expressions of gain with feedback for voltage series configuration. b) Derive an expression for output of Antilog amplifier using op-amp.	CO3	6

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II(Reappear)**	**Review Date**
	School of Engineering and Technology	**Semester: III Reappear (EEE)**
	Programme: B-Tech **Course Name: Electrical Machine-I** **Course Code : EEL 205** 15 OCT 2016	**Session: July-Dec 2016** **Maximum Marks: 20** **Duration :1 Hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks and Course Outcomes are indicated against the questions.
3. Calculator is allowed.

Q1. (a) A 8 pole 240V lap connected series motor has armature and series field resistances of 0.2 Ω and 0.02 Ω respectively. There are 660 armature conductors. If the flux/pole is 0.3 Wb and the total torque developed in armature is 320Nm, find the current taken by the motor & its speed. (5) CO2

(b) What is back emf in DC motor? How does it make the machine self-regulating? (3) CO2

Q2. (a) Draw the construction diagram of DC machine. Why the commutator is used in DC machines? Also draw the connection diagrams of different types of D.C. motors. (5) CO1

(b) A long shunt compound generator has an armature, series field and shunt field resistances of 0.04 Ω, 0.03 Ω & 200 Ω respectively. It supplies a load current of 200 A at 400V. Calculate the generated emf. Assume contact voltage drop/brush=1V. (3) CO1

Q3. Derive the emf equation of D.C. generator. (4) CO2

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NCU THE NORTHCAP UNIVERSITY	**Minor Test II Reappear**	**Review Date:**
	School of Engineering	**Semester: III**
	Programme: B-Tech **Course Name: Instrumentation and Measurement** **Course Code : ECL130** 15 OCT 2016	**Session: (Jul-Dec) 2016** **Maximum Marks: 20** **Duration :1 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks and Course Outcomes (CO) are indicated against the questions.

Q.1 (a)	What is the difference between bonded and unbounded strain gauge? Also explain piezoresistive strain gauge?	5	CO3
(b)	A strain Gauge having a resistance of 500 Ω and a gauge factor of 3.0 is bounded on to a member of structure under tensile stress. Determine the percentage strain suffered by the member if the change in resistance of the gauge is measured to be 1.5 Ω	5	CO3
Q.2	What are different methods for measurement of measurement of temperature? Explain any method in detail for measuring temperature of boilers.	5	CO3
Q.3	Explain the applications of Inductive transducers.	5	CO3

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II**	**Review date:**
	School of Engineering	**Semester: Odd V** **Session: (July-Dec 2016)**
	Programme: B.Tech **Course Name: Power Electronics** **Course Code : EEL-204** 15 OCT 2016	**Maximum Marks:20** **Duration :1.0 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.
3.Calculators are allowed

	COs	Marks
Q1: What are thyristor firing circuits? Explain Resistance firing circuit or resistance-Capacitive firing circuit with the output waveforms, showing the effect of firing angle on the output.	CO2	6
Q2: What are cycloconverters? Explain its principle of operation for single phase to single phase Step-up cycloconverter with the relevant circuit diagrams and waveforms.	CO4	6
Q3: Explain the first quadrant, second quadrant, two-quadrant type-A and two-quadrant type-B Choppers along with circuit diagrams. How are they different from each other?	CO3	5
Q4: A relaxation oscillator, using a UJT, is to be designed for triggering an SCR. The UJT has the following data: $\eta = 0.7$, $I_p = 0.5mA$, $V_p = 15.0$, $V_v = 0.8V$, $I_v = 2mA$, $R_{BB} = 6K\Omega$, leakage current with emitter open = 3mA, firing frequency = 1.5kHz, C= 0.05uF. Compute the values of charging resistor and the external resistors connected in the base circuits. Take forward voltage drop of E-B_1junction as zero.	CO3	3

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NCU THE NORTHCAP UNIVERSITY	**Minor Test-II**	**Review date:**
	School of Engineering	**Semester: Odd 1st** **Session: (July-Dec 2016)**
	Programme: Pre-Ph.D. **Course Name: Power generation** 15 OCT 2016 **Course Code : EEL 704**	**Maximum Marks:20** **Duration :1.0 hr**
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.

Marks

Q1: Explain Solar cell characteristics. With V_{oc}=0.6V, I_{sc} = 30mA/cm^2 and fill factor =76% as solar cell characteristics, what is the efficiency of the cell? 6

Q2: What is solar Photo Voltaic module? How it is obtained? On what factors the power generated using solar cells depends? What is the condition required for connection of PV modules? What happens if there is any mismatch in the module? 6

Q3: What are the various types of DC to DC converters? How output of these controllers is controlled? 6

Q4: What do you mean by Maximum power tracking? 2

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	Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd, V Session: (July-Dec)2016
	Programme: B-Tech Course Name: Antennas and Wave Propagation Course Code: ECL 301	Maximum Marks: 20 Duration: 1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.

15 OCT 2016

Q1. Derive magnetic vector potential A for electric source current J. **4 CO2**

Q2. a. Derive the expressions for electric field, magnetic field, radiated power, radiation density, radiation intensity, radiation resistance and directivity for the half wavelength dipole antenna. **6 CO2**

b. Find out the radiation resistance of an infinitesimal dipole antenna if the length of the antenna is $\lambda/50$. **2 CO2**

Q3. Plot the current distribution on thin wire antenna for quarter wavelength dipole, half wavelength dipole and full wavelength dipole. **4 CO1**

Q4. Derive the array factor for two-element array. **4 CO3**

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