	Minor II (OCT-2016)	**Review Date:**
NCU THE NORTHCAP UNIVERSITY	**School of Engineering and Technology**	**Semester: Odd (THIRD)** *Session: (July -Dec 2015)
	Programme: B.Sc **Course Name: Physics -I** **Course Code :ASL123**	*Maximum Marks:20 *Duration :1.00 hrs
		Sheet 1 of 1

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

Q.1. (a) What will be the Brewster's angle for a glass slab (μ=1.5) immersed in water? (refractive index of water is 1.33) [1]

(b) With a neat diagram explain the action of half shade device. [5]

(c)Calculate the velocity of a particle at which its mass will become eight times of its rest mass. [2]

(c) Write down the postulates of special theory of relativity. [2]

Q.2. (a) Apply Lorentz transformation to derive expression for length contraction and time dilation. [6]

(b) A solution of glucose of specific rotation 52degree/decimeter (gm/cc) is kept in a tube 20 centimeter long. If the rotation produced is 4°, calculate the strength of the solution. [2]

(c) Calculate the ratio of deBroglie wavelengths associated with the neutrons with Kinetic energies of 1.0eV and 510 eV. [2]

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Date:	Date:

NCU THE NORTHCAP UNIVERSITY (FORMERLY ITM UNIVERSITY, GURGAON)	**Minor II**	**Review Date:** 7.10. 2016
	School of Engineering and Technology	**Semester: odd I** *Session: (July-Dec 2016)
	Programme: B.Tech **Course Name: Engineering Physics** **Course Code :ASL121** 15 OCT 2016	*Maximum Marks:20 *Duration :1.00 hr
		Sheet 1 of 1

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

Q.1. (a) Describe the construction, working and limitations of Nicol Prism for obtaining polarized
       light output.
                                                                                                [5]
       (b) Explain the principle of quarter-wave plate.
                                                                                                [2]
       (c) A sample of impure sugar is dissolved in water with concentration 82.5 g/litre. The measured optical
       rotation in a 20 cm tube is 9.9°. If the specific rotation of pure sugar solution is $66°/dm/(g.cm^{-3})$, find the
       percentage purity of the sample.
                                                                                                [3]

Q.2. (a) Explain population inversion and stimulated emission with energy level diagram. How does the use
       a narrow tube help in a He-Ne laser?
                                                                                                [5]
       b) Differentiate between single mode and multi-mode fiber, and compare their advantages and
       disadvantages.
                                                                                                [3]

       c) A step index fibre has a numerical aperture 0.16, a core refractive index of 1.45 and a core dia. of 62.5μm.
       Determine the V-parameter if the wavelength of 0.78μm is transmitted through it.
                                                                                                [2]

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| Date: | Date: |

	Format for Question paper for Minor Test 2	Review Date:
NCU THE NORTH CAP UNIVERSITY	School of Engineering	Semester: Odd I
	Programme: Pre PhD Course Name: Experimental Techniques in Material Science Course Code : ASL 701	* Session: (July-Dec)
		*Maximum Marks:15 *Duration :1 hr
		Sheet 1 of 1

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

15 OCT 2016

Q1.

A:- Explain the coating of thin film by Chemical Vapor Deposition. What is the role of reactive gases and pressure in this process?   [5]

B:-Write a short note on material engineering by Ion implantation.   [3]

Q2.

A:- Differentiate between Langmuir-Hinshelwood mechanism and Elay-Riedel mechanism.   [4]

B:- Schematically describe the process of transferring a pattern on some semiconductor surface by Photolithography   [3]

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	Minor II, Oct 2016	Review Date:
School of Engineering & Technology		Semester: Odd
Programme: B-Tech (Reappear)		* Session: (July-Dec)
Course Name: Numerical Methods		
Course Code : ASL 210	15 OCT 2016	*Maximum Marks: 20
		*Duration :1.00 hrs
		Sheet 1 of 1

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

Q1.a) Write the fourth divided differences for the given 5 points (x_0, x_1, x_2, x_3, x_4). **[1]**

b) Does cubic spline have second derivatives at the nodes constant values? **[1]**

Q2.a) Evaluate $\int_0^4 e^x dx$ by Simpson's 1/3rd rule and compare it with the actual values. **[3]**

b) Find the minimum value of *y* from the following table: **[3]**

x	0	1	2	3
y	3	4	8	5

c) Using Euler's method evaluate *y* at *x* = 0.6 from $\frac{dy}{dx} = 1 - 2xy,\ y(0) = 0,$ taking step size *h* =0.2 **[3]**

d) Determine *f(x)* as a polynomial in *x* for the following data: **[3]**

x	4	5	7	10	11	13
y	48	100	294	900	1210	2028

Q3. Find the distance moved by a particle and its acceleration at the end of 8 seconds, if the time versus velocity data is as follows **[6]**
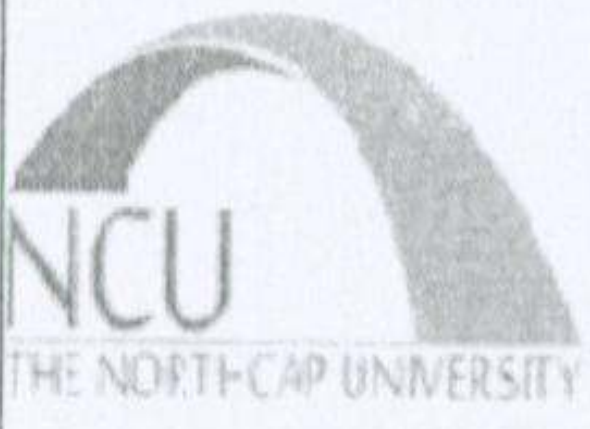
t	0	2	4	6	8
v	4	6	16	34	60

- *All questions are compulsory.*
- *This paper is common for all branches of engineering.*
- *Please write question number on your answer sheet according to question paper.*

15 OCT 2016

Q.1 Distinguish between dia, para and ferro-magnetic substances. Give an account of Langevin's theory of diamagnetism and show that diamagnetic susceptibility is independent of temperature.

(7)

Q2 The magnetic susceptibility of aluminum is 2.3×10^{-5}. Find its permeability and relative permeability.
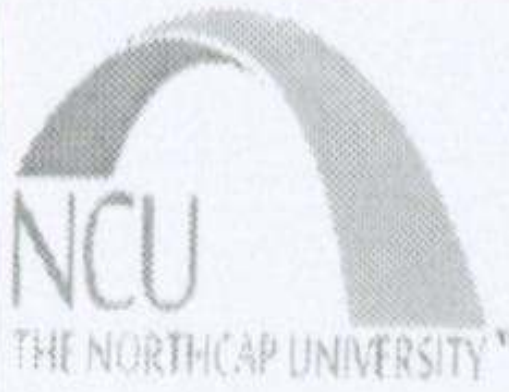
(4)

Q3 (a) Using Drude's free electron theory of metals, derive Ohm's law.

(6)

(b) Calculate the drift velocity of electrons in an aluminum wire of diameter 0.9 mm carrying current of 6A. Assume that 4.5×10^{28} electrons/m^3 are available for conduction.

(3)

NCU THE NORTHCAP UNIVERSITY	**THE NORTHCAP UNIVERSITY** GURGAON	B.Tech. ECE Semester: III Session: 2016-2017
	Minor Examination: October 2016 **Course Name: Applied Mathematics (Reappear)** Course Code: ASL-203	Total Marks: 20 Duration: 60 Mins

➢ All questions are compulsory.
➢ Please write question number on your answer sheet according to question paper.

Q1. Show that derivative of *f(z)* does not exist when $f(z) = \frac{2xy(x+iy)}{x^2+y^2}$ *if* $z \neq 0$
$$= 0 \quad if \ z = 0$$ **[5]**

Q2. Find the analytic function $f(z) = u + iv$ where $u = 3xy^2 - x^3$. **[5]**

Q3. Using Cauchy integral formula, Evaluate $\oint_C \frac{e^{2z}}{(z-1)(z-2)} dz$ where C is circle$|z| = 3$. **[5]**

Q4. A businessman goes to hotels X, Y, Z for 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. (a) Determine the probability that the business goes to hotel with faulty plumbing (b) What is the probability that businessman's room having faulty plumbing is assigned to hotel Z?

[5]

	Format for **Question paper for Minor Test 2**	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering	Semester: Odd I
	Programme: Pre PhD **Course Name: Synthesis of Nanomaterials** **Course Code : ASL 711** 15 OCT 2016	* Session: (July-Dec)
		*Maximum Marks:15 *Duration :1 hr
		Sheet 1 of 1

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

Q1.

A:- What is Sol-gel process? Explain the effect of temperature on the formation of Aerogels. [4]

B-What are the advantages of synthesis of nanomaterials by chemical route? [3]

Q2.

A:- Explain in detail the synthesis of semiconductor nanoparticles by colloidal route. [4]

B:- What is the significance of using capping agent for synthesis of nanoparticles? [2]

C:- How the physiochemical properties of nanomaterials changes with its particle size? [2]

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Date:	Date:

15 OCT 2016

	Minor II, Oct 2016	Review Date:
NCU THE NORTHCAP UNIVERS	**School of Engineering & Technology** **Programme: B-Tech (ECE & CE)** **Course Name: Engg. Maths III** 15 OCT 2016 **Course Code : ASL201**	Semester: Odd (III) Session: (July-Dec)2016 Maximum Marks: 15 Duration :1.00 hrs Sheet 1 of 1

Note: 1. All questions are compulsory.
      2. Marks are indicated against the questions.
      3. Use of calculator permitted.
CO4: *Use elementary analytic functions, Cauchy Riemann Equations and Harmonic functions*
CO5: *Able to evaluate residues at singularity, integrate complex functions and expand in Laurent Series*

Q1.   Find the derivative of $f(z) = 3z^2 + 4iz - 5 + i$ at $z = 2$.   **[1]**

Q2.   Find whether the function $u(x, y) = 2xy + 3xy^2 - 2y^3$ is harmonic?   **[1]**

Q3.   Separate the function $e^{(5+3i)^2}$ into real and imaginary parts.   **[1]**

Q4.   Determine and classify all singularities of $f(z) = \dfrac{z^4}{1 + z^4}$ **[1]**

Q5.   Using Residue Theorem, evaluate $I = \oint_c \dfrac{z^4}{z^3 + 2z^2 + 2z} dz$ where c is $|z| = 1$.   **[2]**

Q6.   Determine the analytic function $f(z)$ if $\mathrm{Re}(f'(z)) = 3x^2 - 4y - 3y^2$ and $f(1 + i) = 0$.   **[3]**

Q7.   Evaluate $\int_c (z - z^2) dz$ where c is the upper half of the circle $|z - 2| = 3$. What is the value of the integral if c is the lower half of the same circle?   **[3]**

Q8.   Expand $f(z) = \dfrac{z - 1}{z + 1}$ as a Taylor series about $z = 0$ and $z = 1$. Also find its Laurent's series expansion for the domain $1 < |z| < \infty$ **[3]**

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Date:	Date:

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	Minor II, Sept 2016	Review Date:
	School of Engineering & Technology	Semester: Odd * Session: (July-Dec)
	Programme: B-Tech (Reappear) Course Name: Probability and Statistics Course Code : ASL 220 15 OCT 2016	*Maximum Marks: 20 *Duration :1.00 hrs
		Sheet 1 of 1

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

Q1.   Six coins are tossed 6400 times. Using the Poisson distribution, find the approximate [2] probability of getting six heads 2 times.

Q2.   Define uniform random variable. If you arrive at a bus stop at 10 o'clock, knowing that the [4] bus will arrive at some time uniformly distributed between 10 and 10:30.

   a) What is the probability that your will have to wait longer than 10 minutes.

   b) If at 10:15 the bus has not yet arrived, what is the probability that you will have to

       wait at least an additional 10 minutes

Q3.   A random variable X has the following probability distribution [4]

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

   c) Find k

   d) Evaluate P (2<X<6).

Q4.   If 10% of the affecting aircrafts are expected to be shot down before reaching the target, [6] what is the probability that out of 5 aircrafts at least 4 will be shot before they reach the target?

Q5.   A sample of 100 items is taken at random from a batch known to contain 40% defectives. [4] What is the probability that the sample contains:

   a) At least 44 defectives

   b) Exactly 44 defectives

THE NORTHCAP UNIVERSITY
Minor Test-II (October-2016)
School of Engineering & Technology

Programme: PhD Course Work
Course Name: Material Characterization
Course Code : ASL-702

15 OCT 2016

Review Date:	
Semester: Odd Sem Session: (July-Dec)	
Maximum Marks: 15 Duration :1.00 hrs	
Sheet 1 of 1	

Note: 1. **Marks** are indicated against the questions.
   2. Make suitable **diagrams** where ever necessary.
   3. All questions are **compulsory**.

Q.1 What is chemical shift? Explain the principle of NMR spectroscopy.   [3]
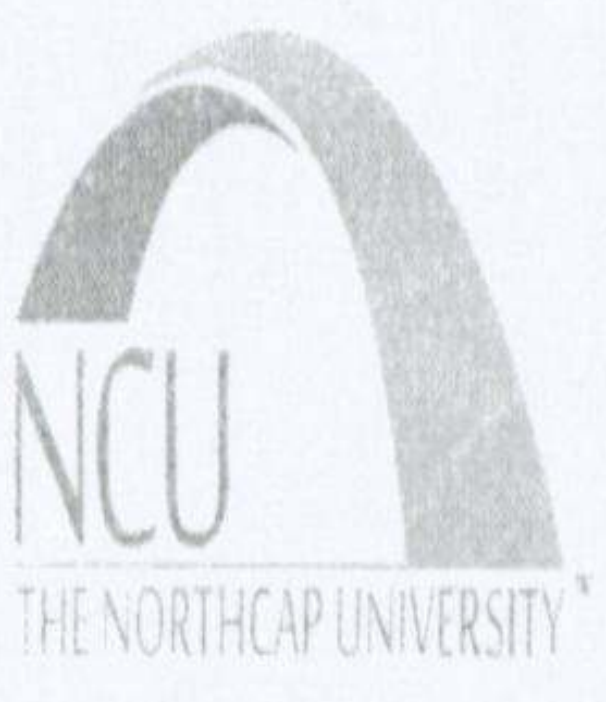
Q.2 Explain the Mclaferty rearrangement of mass spectroscopy.   [3]

Q.3 Using one example explain thermal degradation curve with the help of TGA and DTA.   [3]

Q.4 What is electronic spectroscopy? What is its absorption range? Write the relationship between wavelength, frequency and wave number.   [3]

Q.5 Calculate the absorption maximum in ethanol for *p*-chloroacetophenone.   [3]

Issued by:	Approved by:
Date:	Date:

	THE NORTHCAP UNIVERSITY	Review Date: 01/03/2014
	Minor -II Test Oct-2016	**Semester**: Odd **Session**: 2016-17 **Branch**: B.Tech-I (all branches)
	School of Engineering and Technology	
	Programme: B.Tech **Course Name: Engg. Mathematics-1** **Course Code: ASL-101**	Sheet-1of 1 Max. Marks-20 Time: 1 hour

NOTE: 1. All questions are compulsory.
2. Use of simple Calculator is permitted

17 OCT 2016

1. Evaluate by changing the order of integration $\int\limits_{0}^{1}\int\limits_{2y}^{2} e^{x}\,dxdy$. [4]

2. Use the method of the Lagrange's multipliers to find the volume of the largest rectangular parallelopiped that can be inscribed in the ellipsoid $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}+\dfrac{z^2}{c^2}=1$. [4]

3. If $u^3+v^3=x+y,\ u^2+v^2=x^3+y^3$, then show that $\dfrac{\partial(u,v)}{\partial(x,y)}=\dfrac{(y^2-x^2)}{2uv(u-v)}$, using property of Jacobians for Implicit functions. [4]

4. Find the volume of region bounded by the cylinder $x^2+y^2=16$ and point $z=0$ to $z=3$ using triple integrals. [4]

5. Transform the integral $\int\limits_{y=0}^{a}\int\limits_{x=0}^{\sqrt{a^2-y^2}} (a^2-x^2-y^2)\,dxdy$ by changing to polar coordinates and hence evaluate it. [4]

THE NORTHCAP UNIVERSITY
Minor Exam II(October-2016)

School of Engineering and Technology
Programme: B Tech-ECE
Course Name: Applied Chemistry
Course Code : ASL 150

Review Date:

Semester: ODD / I
Session: (July-Dec)

Maximum Marks: 20
Duration : 1 hr

Sheet 1 of 1

Note: 1. All questions are compulsory.
2. Marks are indicated against the questions.   **18 OCT 2016**

Course Outcomes

CO3: Students will be able to understand the technologies for wastewater treatment to make it suitable for human consumption and industrial application and quantitatively monitor the water chemistry using standard techniques

CO4: Students will be learning about principles of spectroscopy, thermal methods of analysis and understand the importance of quantitative and qualitative analysis of material.

Q1. What is principal of reverse osmosis ? How it helps in desalination of brackish water?	CO3	[2]
Q2. Explain auxochrome and chromophore with proper example.	CO4	[2]
Q3. Explain ion exchange method of purifying the water. Discuss their use and regeneration giving reaction involved.	CO3	[2+1+1]
Q3. 50 mL of water sample required 6mL of N/50 H_2SO_4 for neutralization phenolphthalein end point. Another 14mL of same acid was needed for further titration to methyl orange end point. Determine the type and amount of alkalinity.	CO3	[4]
Q4. A standard hard water contains 18 gm. of $CaCO_3$ per litre. 40 mL of this required 50 mL of EDTA soln., 40 mL of sample water required 16 mL of EDTA solution. The sample after boiling required 4 mL EDTA soln. Calculate the temporary permanent and total hardness of the given sample of water, in terms of ppm.	CO3	[4]
Q5. Derive Lambert Beer's Law. Also mention limitation of this law.	CO4	[3+1]

	THE NORTHCAP UNIVERSITY Minor Test-II (October-2016)	Review Date:
	School of Engineering & Technology, School of Management **Programme: B. Tech (ME, ECE, CV), B. Sc-Math, BBA, B.Com** **Course Name: Environmental Studies** **Course Code : ASL140** 1 8 OCT 2016	Semester: Odd Session: (Jul-Dec) ME-III, ECE-VIII, CV-III), Bsc-Math-III, BBA-III, B.Com-I
		Maximum Marks: 15 Duration :1.00 hrs
		Sheet 1 of 1

Note: 1. **MARKS** are indicated against the questions.
2. Make suitable **DIAGRAMS** where ever necessary.
3. All questions are **COMPULSORY**

CO2: To apply the concepts learnt in maintaining balance in natural ecosystems and it covers all aspects of life and contributes in constructive decision-making keeping environment in view.

Q.1 Using suitable diagrams and appropriate reasons explain the point where the nitrogenous fertilizer is recycled in **N-cycle** and also explain the role of ammonification in this cycle.   [3]

Q.2 (i) Giving two examples, explain the conditions to declare a place as hot spot of biodiversity.   [1.5]

(ii) In 2010 former Environment and Forestry minister Mr Jairam Ramesh ignored the findings of a scientific panel that had declared genetically modified brinjal unsafe for human consumption. In this regard explain the controversial case of *Bt-brinjal* and its possible effects on the environment.   [1.5]

Q.3 With the help of suitable diagrams explain any two types of energy flow models explaining different energy rules followed during the transformation of energy in various ecosystems.   [3]

Q.4 (i) Giving suitable examples, explain three major values of biodiversity.   [1.5]

(ii) With the help of two examples, differentiate between species biodiversity and ecosystem biodiversity.

[1.5]

Issued by:	Approved by:
Date:	Date:

NCU-FRM-29

Minor Test II (Reappear) October 2016

School of Engineering

Programme: B-Tech
Course Name: Engineering Physics
Course Code : ASL121

Review Date:	
Semester: Odd I	
Session: (July-Dec)	
Maximum Marks:20 Duration :1 hr	
Sheet 1 of 1	

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

Q1.

A:- Describe the construction and working of a Laurent's half shade polarimeter?   5

B:- Differentiate between uniaxial and biaxial crystals with examples?   3

C:- Calculate the thickness of quarter wave plate of a quartz for light of wavelength 5000 A^0, given refractive indices for ordinary ray and extraordinary ray as 1.554 and 1.533, respectively?   2

Q2:

A:- Explain with the help of diagram the principle and working of a He-Ne laser?   5

B:- What is the difference between step index multimode and graded index multimode fiber with diagram?   3

C:- A graded index fiber has a core diameter of 0.05 mm and numerical aperture of 0.22 at a wavelength of 8500 A^0. What are the V- number and number of modes guided in the core?   2

Issued by:	Approved by:
Date:	Date:

	THE NORTHCAP UNIVERSITY Re Minor Test-II (October-2016)	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering & Technology, School of Management Programme: B. Tech (ME, ECE, CV), B. Sc-Math, BBA, B.Com Course Name: Environmental Studies Course Code : ASL-140	Semester: Odd Session: (Jul-Dec) ME-III, ECE-VIII, CV-III), Bsc-Math-III, BBA-III, B.Com-I
		Maximum Marks: 15 Duration :1.00 hrs
		Sheet 1 of 1

Note: 1. **MARKS** are indicated against the questions.
　　　2. Make suitable **DIAGRAMS** where ever necessary.
　　　3. All questions are **COMPULSORY**

CO2: To apply the concepts learnt in maintaining balance in natural ecosystems and it covers all aspects of life and contributes in constructive decision-making keeping environment in view.

Q.1 What is **ecological succession**? Giving suitable examples of ecosystem explain hydrarch succession and xerarch succession. **[3]**

Q.2 Using suitable examples differentiates between **national park** and **wildlife sanctuaries**. **[3]**

Q.3 (i) Using suitable examples explains the three major **threats** which are responsible for the loss of biodiversity? **[1.5]**
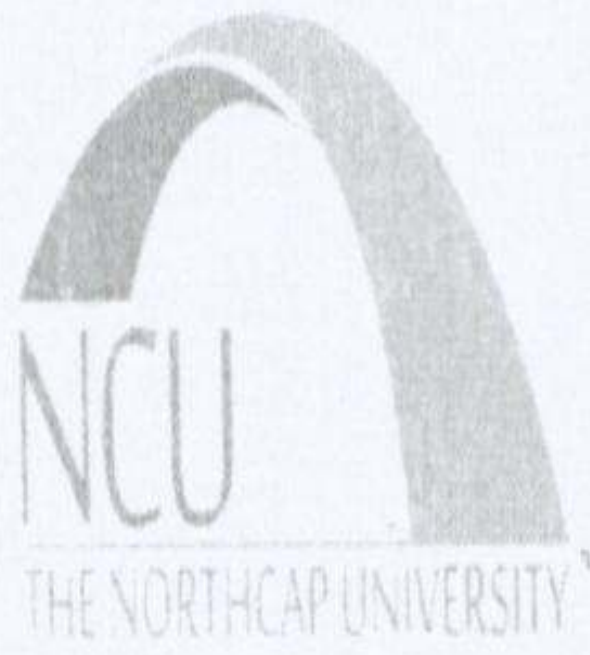
(ii) Giving suitable examples, discuss the role of human interference in changing the **biodiversity** and the nature of the **ecosystem**. **[1.5]**

Q. 4 With the help of double channel model define the **grazing** food chain and **detritus** food chain with suitable examples. **[3]**

Q.5 (i) In a forest ecosystem, assuming plants absorb **65000** kilo joules of energy from sunlight by photosynthesis, calculate the amount of energy of sunlight and the energy which transferred to each tropic level. Draw suitable diagram to justify your answer . **[1.5]**

(ii) Giving emphasis on various environmental aspects and examples, explain the status of different positions of human beings which can be occupied in **food chains**. **[1.5]**

Issued by:	Approved by:
Date:	Date:

	THE NORTHCAP UNIVERSITY	Review Date:
		Semester: Odd
	Reappear Minor -II Test Oct-2016	**Session**: 2016-17
	School of Engineering and Technology	**Branch**: B. Tech-I (all branches)
	Programme: B. Tech **Course Name: Engg. Mathematics-1** **Course Code: ASL-101**	Sheet-1of 1 Max. Marks-20 Time: 1 hour

NOTE: 1. All questions are compulsory.
2. Use of simple Calculator is permitted

1. Change the order of integration and evaluate $\int\limits_{0}^{1}\int\limits_{e^x}^{e}\dfrac{dxdy}{\log y}$. [4]

2. Find the maximum value of $u = x^p\, y^q\, z^r$ when the variables x, y, z are subject to the condition $ax + by + cz = p + q + r$. [4]

3. Using Jacobians, show that the functions $u = x + y + z, v = x + yz + zx, w = x^3 + y^3 + z^3$ are not independent. [4]

4. Find the area common to the cardioids $r = a(1 + \cos\theta)$ and $r = a(1 - \cos\theta)$. [4]

5. Expand $x^2 y + 3y - 2$ in powers of (x-1) and (y+2) using Taylor's theorem. [4]

	THE NORTHCAP UNIVERSITY	Review Date:
	Re Minor Test-II (October-2016)	
	School of Management	Semester: Odd
	Programme: BBA	Session: (Jul-Dec)
	Course Name: Environmental Studies	BBA-III
	Course Code : ASL-140 21 Oct 2016	Maximum Marks: 15 Duration :1.00 hrs
		Sheet 1 of 1

Note: 1. **MARKS** are indicated against the questions.
     2. All questions are **COMPULSORY**

CO2: To apply the concepts learnt in maintaining balance in natural ecosystems and it covers all aspects of life and contributes in constructive decision-making keeping environment in view.

Q.1 Using suitable diagrams and appropriate reasons explain the point where the sulphuric acid is recycled in **S-cycle** and also explain the role of acid rain in this cycle. [3]

Q.2 What is **ecological pyramid**? Giving suitable examples of ecosystem differentiate between food web and food chain. [3]

Q.3 Using suitable examples differentiates *ex-situ* and *in-situ* conservation with the help of **national park** and **wildlife sanctuaries**. [3]

Q. 4 With the help of **Y-shaped** energy model define the grassland ecosystem and detritus ecosystem with suitable examples. [3]

Q.5 In a desert ecosystem:

Desert Ecosystem
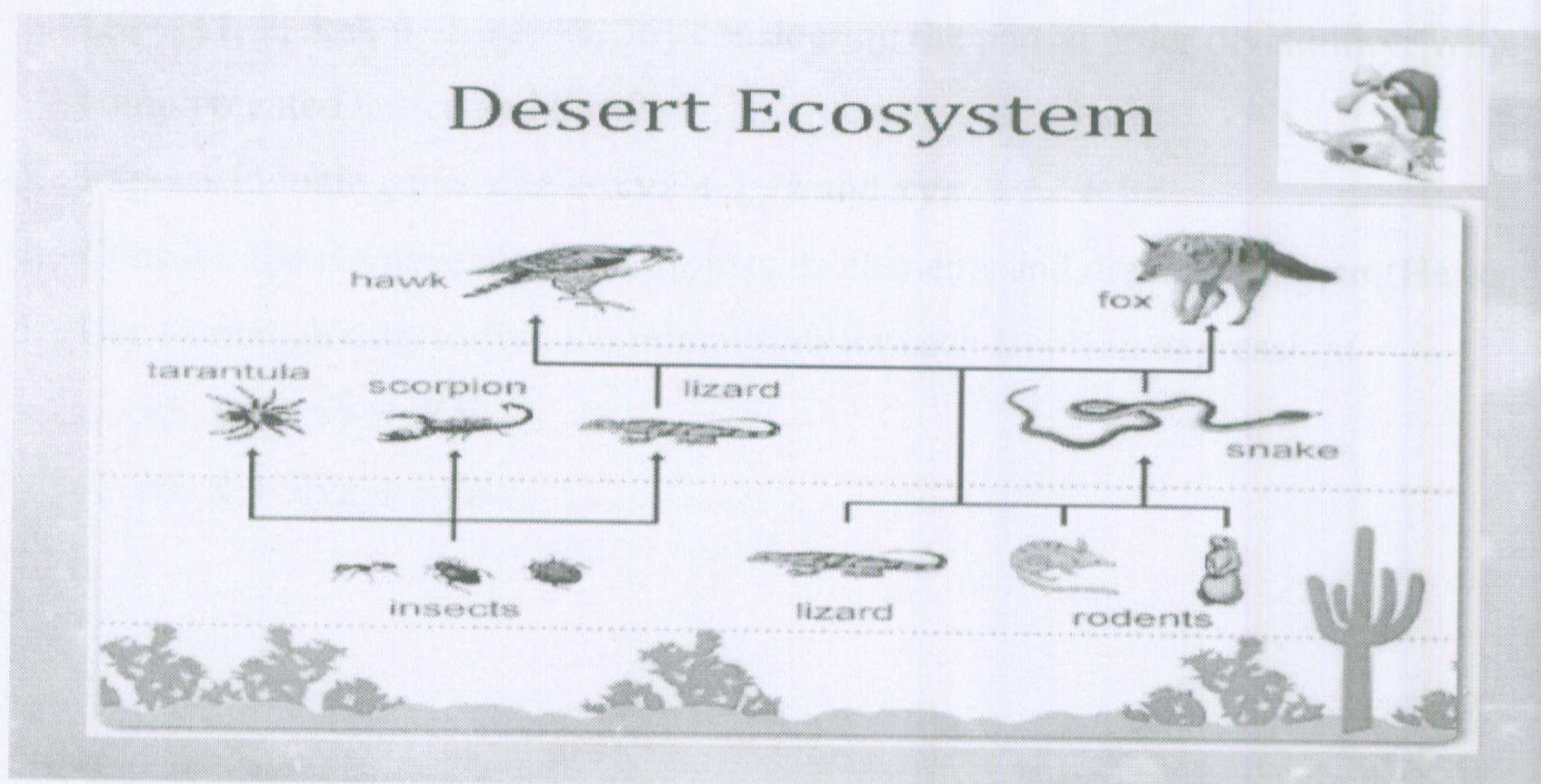
Assuming hawk transferred **45** kilo joules of energy to the next tropic level, calculate the amount of energy of sunlight and the energy which is consumed to each tropic level. Also explain law of thermodynamics to justify your answer. [3]

Issued by:	Approved by:
Date:	Date:

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

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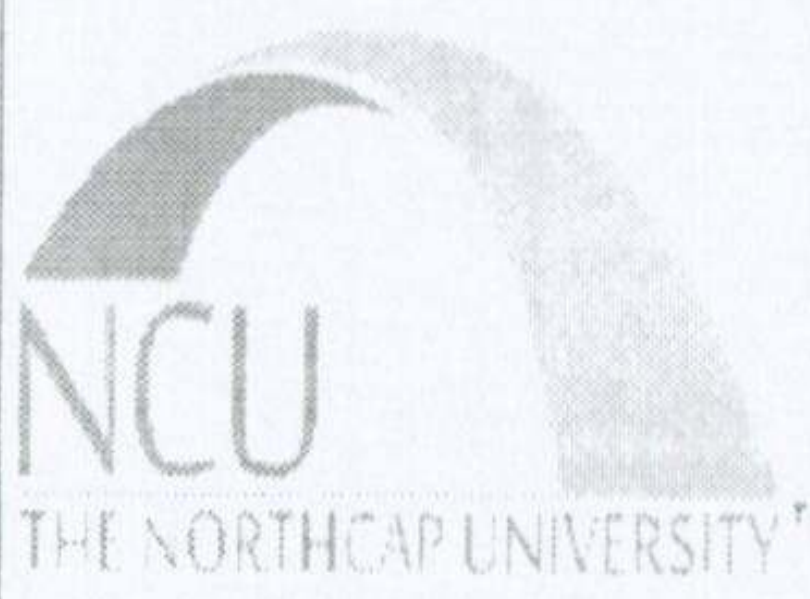   2. All question carry equal marks.

19 OCT 2016

Q.1 Find the complete integral of the partial differential equation $9(p^2z+q^2)=4$

Q.2 Solve $(r + s - 2t) = e^{x+y}$

Q.3 Find a complete integral of $(x^2p^2 + y^2q^2) = z^2$

Q.4 Find a surface passing through the two lines $z = x = 0,\ z\text{-}1 = x\text{-}y = 0$ satisfying the equation $r - 4s + 4t = 0.$

Q.5 Solve $(D - D'^2)z = cos(x - 3y)$

	The NorthCap University GURGAON	MSc-Mathematics Semester: III Session: 2016-2017
NCU THE NORTHCAP UNIVERSITY	Minor-2 Examination: October- 2016 **Course Name: Methods of Applied Mathematics** Course Code: MAL 603	Total Marks: 20 Duration: 1 hr

➢ All questions are compulsory.
➢ Please write question number on your answer sheet according to question paper.

Q1. Prove directly that the transformation

$$Q_1 = q_1 \qquad\qquad P_1 = p_1 - 2p_2$$
$$Q_2 = p_2 \qquad\qquad P_2 = -2q_1 - q_2$$

is canonical and find the generating function. **[3]**

Q2. Find the curves on which the functional $\int_1^2 \frac{x^3}{y'^2} dx$ with $y(1) = 0$ and $y(2) = 3$ can be extremized. **[4]**
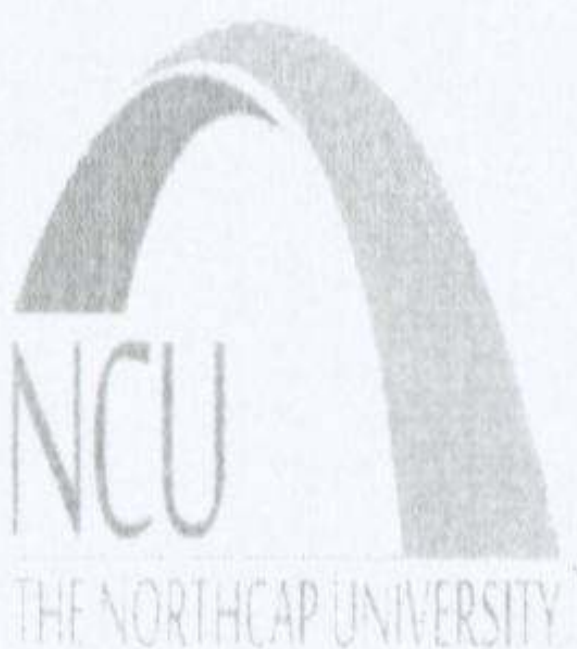
Q3. Find the shortest distance between circle $x^2 + y^2 = 4$ and straight line $2x + y = 6$. **[4]**

Q4. Find the extermals of the functional $\int_0^{\pi/2} \left\{ 2xy + \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2 \right\} dt$ with conditions $x(0) = 0$, $x\left(\frac{\pi}{2}\right) = -1, y(0) = 0, y\left(\frac{\pi}{2}\right) = 1$.

[4]

Q5. Solve the boundary value problem $\frac{d^2y}{dx^2} + y = e^x$ with $y(0) = 0, y\left(\frac{\pi}{2}\right) = 0$ by direct method and Ritz method.

[5]

	The NorthCap University	Review Date:
	Minor -2 Test Oct-2016	**Semester**: Odd **Session**: 2016-2017
NCU THE NORTHCAP UNIVERSITY	**School of Engineering and Technology**	**Branch**: B. Sc (Mathematics) 1st Sem
	Programme: B. Sc (Mathematics) **Course Name: Introduction to Probability** **Course Code: MAL-103** 19 OCT 2016	Sheet-1of 1 Max. Marks-15 Time: 1 hour

NOTE: 1. All questions are compulsory.
2. Marks are mentioned against the question.
3. Table for Normal Distribution is provided.

1. The diameter of an electric cable, say X is assumed to be a continuous random variable with pdf :

   $f(x) = 6x(1-x), 0 \le x \le 1.$

   (i)   Check that f(x) is a pdf.

   (ii) Determine a number b such that   P(X<b) = P(X>=b).

2. A random variable X has the following probability distribution

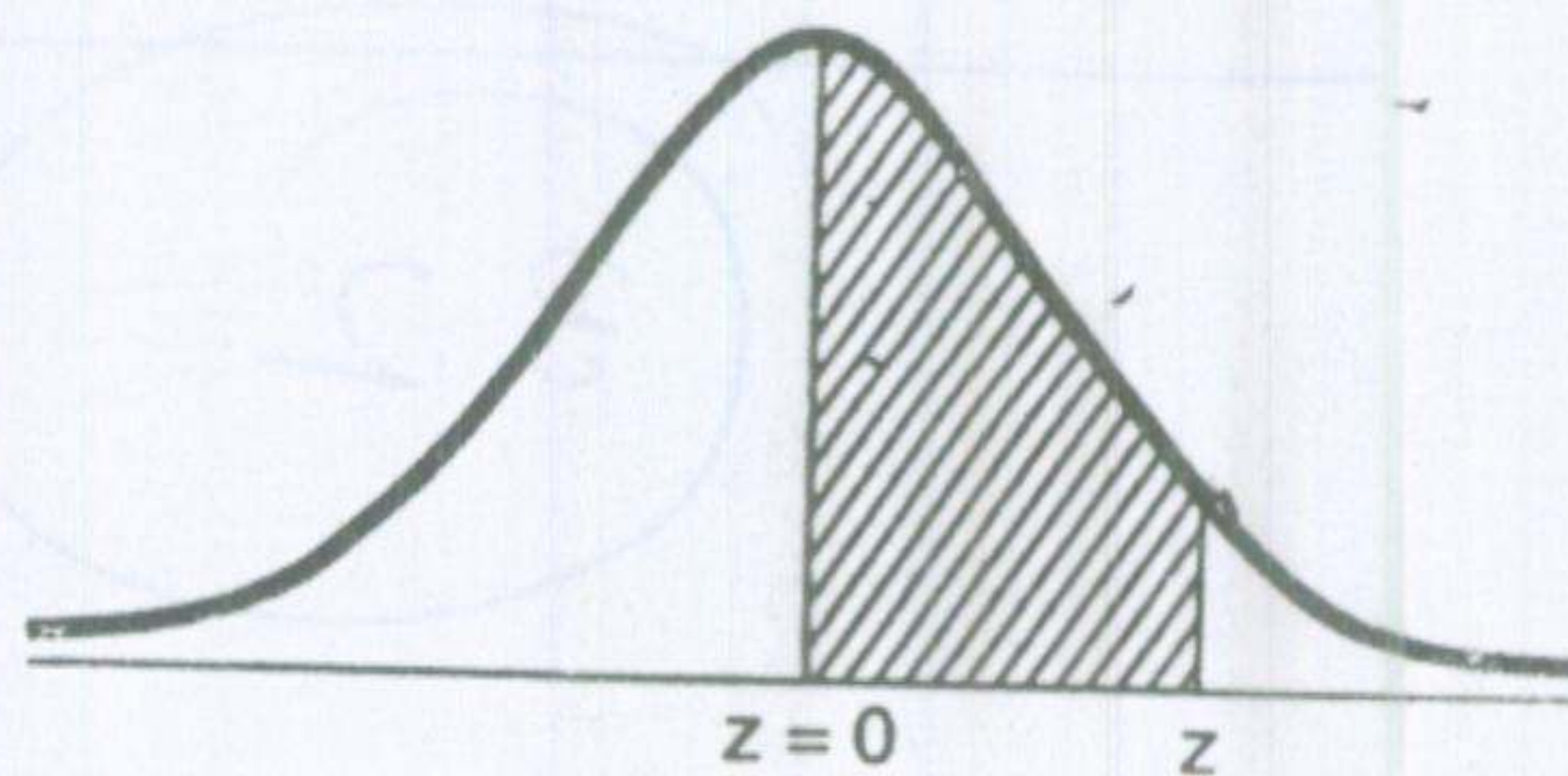| X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$
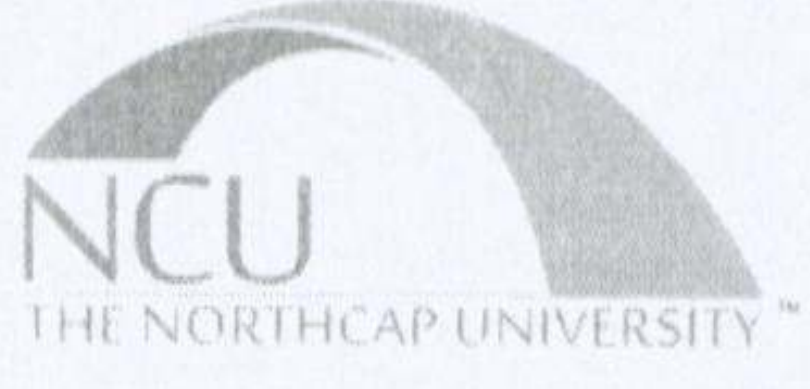
   (i)   Find k

   (ii) Evaluate P(X<3), P(X<=6), P (0<X<3).

3. A coffee connoisseur claims that he can distinguish between a cup of instant coffee and a cup of percolator coffee 75% of the time. It is agreed that his claim will be accepted if he correctly identifies at least 5 of the 6 cups. Find his chances of having the claim (i) accepted, (ii) rejected, when he does have the ability he claims.

4. In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Calculate the approximate number of packets containing no defective, one defective and two defective blades in a consignment of 10,000 packets. (Given $e^{-0.02}=0.9802$).

5. A sample of 100 dry battery cells tested to find the length of life produced gave mean life as 12 hours and standard deviation as 3 hours. Assuming the data to be normally distributed what percentage of battery cells are expected to have life (i) more than 15 hours, (ii) less than 6 hours and (iii) between 10 and 14 hours?

Table : NORMAL TABLE

AREAS UNDER THE STANDARD NORMAL CURVE

$$= \frac{1}{\sqrt{2\pi}} \int_0^z e^{-\frac{z^2}{2}} dz$$

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2485	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4255	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4930	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4962	.4963	.4964
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4999	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

	The NorthCap UNIVERSITY	Review Date: 01/03/2014
	Minor-II	**Semester**: Odd
		Session: July-Dec
	School of Engineering and Technology	**Branch**: B.Sc.
NCU THE NORTHCAP UNIVERSITY	**Programme: B.Sc.** **Course Name: Mathematical Methods** **Course Code: MAL-303**	Max. Marks-20 Time: 1 hours

NOTE: 1. Marks are indicated against the questions
     2.All Questions are compulsory
    1 8 OCT 2016

Q:1   An infinite string is initially at rest and that the initial displacement f(x), $(-\infty < x < \infty)$. Determine the displacement $y(x,t)$ of the string.   3

Q:2   If $F(x) = |\cos x|$ expand $F(x)$ as a Fourier series in the interval $(-\pi, \pi)$.   4

Q:3   Find the complex form Fourier series of a periodic function $F(x)$ of period $2l$ 4

Q:4   Find the Fourier cosine transform of $F(x) = \dfrac{1}{1+x^2}$. Hence derive Fourier sine transform of $\phi(x) = \dfrac{x}{1+x^2}$ 3+2

Q:5   What is Convolution? State and prove Convolution theorem for Fourier transforms.   1+1+2

	Question paper for Minor II, OCT. 2016	Review Date:07.10.2016
NCU THE NORTHCAP UNIVERSITY	School of Engineering & Technology	Semester: odd-III *Session: (July-Dec.))
	Programme: MSc (Maths) Course Name: Fluid Mechanics **18 OCT 2016** Course Code : MAL 605	Maximum Marks: 15 Duration :1 hrs
		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.*

Q1a). Discuss Divergence theorem and show that divergence of a vector field is scalar function.
            (Marks 2)
            CO 4

Q1b). Give the full derivation of Continuity Equation
            (Marks 3)
            CO 2

Q1c). Evaluate the velocity and acceleration components at a point (1, 2, 3) at a time $t = 1$ for a flow
    Field, $U = 5x^3 i - 15x^2 y j + t k$ (Marks 2)
            CO 2

Q2a).Give the principle and Derivation of the momentum based Navier Stokes equations with physical
    interpretation of each term of the Equation.   (Marks 3)
            CO 3

Q2b). Define the Reynolds and Froude Numbers with their dimensions.   (Marks 2)
            CO 3
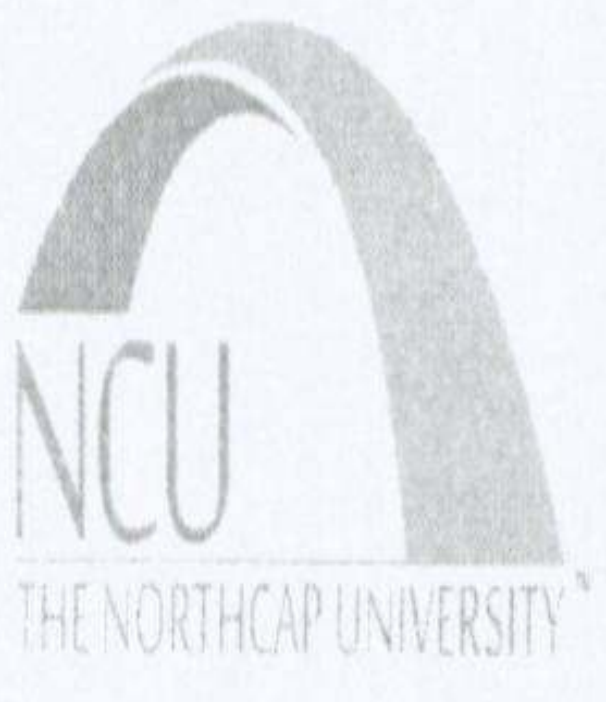
Q2c). A jet engine when tested statistically on a test stand takes in air at 200 m/s and discharge the exhaust
    gases at 1500 m/s. The inlet and exhaust cross-sections are 0.5 m^2 each. Fuel to air ratio is 1:50.
    Determine the force expected to act on the engine. Assume the density of air at entry = 1.2 kg/m^3.
            (Marks 3)
            CO 1

	The NorthCap University	Review Date: 01/03/2014
	Minor -2 Test Oct-2016	**Semester**: Odd **Session**: 2016-2017
	School of Engineering and Technology	**Branch**: M. Sc (Mathematics) 1st SEM
	Programme: M. Sc (Mathematics) Course Name: Ordinary Differential Equations Course Code: MAL-503	Sheet-1of 1 Max. Marks-15 Time: 1 hour **1 8 OCT 2016**

NOTE: 1. All questions are compulsory.
2. Marks are mentioned against the question.

1. Let ϕ be any solution of $L(y) = y^{(n)} + a_1 y^{(n-1)} + \ldots + a_n y = 0$ on an interval I containing a point x_0. Then for all x in I

$$\|\phi(x_0)\| e^{-k|x-x_0|} \leq \|\phi(x)\| \leq \|\phi(x_0)\| e^{k|x-x_0|},$$

where, $k = 1 + |a_1| + |a_2| + \ldots + |a_n|,$

$$\|\phi(x)\| = \left[|\phi(x)|^2 + \ldots + |\phi^{(n-1)}(x)|^2 \right]^{1/2}$$

[3]

2. Two solutions ϕ_1, ϕ_2 of L(y) = 0 are linearly independent on an interval I if and only if, [3]
   $W(\phi_1, \phi_2)(x) \neq 0$ for all x in I.

3. Let $y^{(n)} + a_1 y^{(n-1)} + \ldots + a_n y = 0$ be any constant coefficient equation, and suppose $\phi_1, \phi_2, \ldots, \phi_n$ are solutions satisfying for some real x_0,

   $\phi_i^{(j-1)}(x_0) = \delta_{ij} \ (i, j = 1, .., n),$

   $\delta_{ij} = 1 (i = j) \ \& \ \delta_{ij} = 0 (i \neq j).$

   (a) Show that $\phi_1, \phi_2, \ldots, \phi_n$ are linearly independent.

   (b) If $\phi^{(j-1)} = \alpha_j \ (j = 1, 2, .., n),$ show that $\phi = \alpha_1 \phi_1 + \alpha_2 \phi_2 + \ldots + \alpha_n \phi_n$. [3]

4. Let ϕ_1, ϕ_2 be two solutions of $L(y) = y^{(2)} + a_1(x) y^{(1)} + a_2(x) y$, on an interval I, let x_0 is some

   point in I, then $W(\phi_1, \phi_2)(x) = \exp\left[-\int_{x_0}^{x} a_1(t) dt \right] W(\phi_1, \phi_2)(x_0).$ [3]
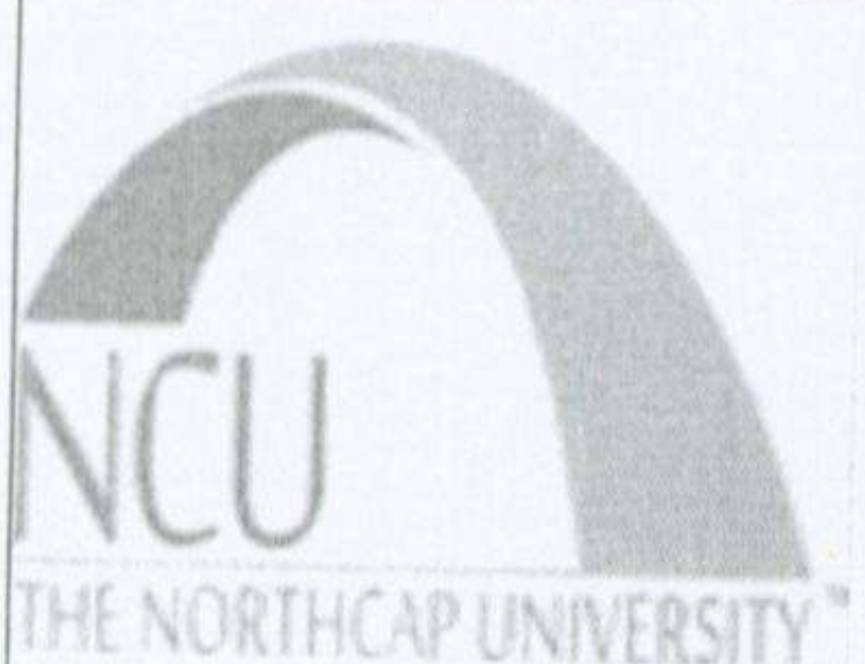
5. Consider the equation $y''' - 4y' = 0$. [3]
   (a) Calculate three linearly independent solutions.
   (b) Compute the Wronskian of the solutions found in (a).
   (c) Find that solution ϕ satisfying $\phi(0) = 0, \phi'(0) = 1, \phi''(0) = 0.$

	NORTH CAP UNIVERSITY	REVIEW DATE: /10/16
	Minor 2 Test	Semester: Odd I
	School of Engineering & Technology	Session : July to Dec.
	Programme: B.Sc(H) Mathematics	
	Course Name: Analysis II	Maximum Marks: 15
	Course Code :MAL201	Duration: 1 hr

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

1. Define $f(x) = \begin{cases} x-1 & if \ x \le 2 \\ 2x-2 & if \ x > 2 \end{cases}$

Use sequential criterion for continuity/ discontinuity, to prove or disprove that f is continuous at $x = 2$. ----(3)

2. Prove: Composition of two continuous functions is continuous. ---(2)

3. Define Darboux function. Give an example of a Darboux function which is not continuous. ------(4)

4. Using $\varepsilon - \delta$ definition, prove that the Dirichlet's function is nowhere continuous. -------(3)

5. Is $f(x) = x^2$ uniformly continuous on R? Prove or disprove. ----(3)

	NORTH CAP UNIVERSITY	REVIEW DATE:01/03/14
	Minor II Test	Semester: Odd I
	School of Engineering & Technology	Session : July to Dec.
	Programme: B.Sc(H) Mathematics	
	Course Name: Algebra I	Maximum Marks:20
	Course Code :MAL105	
	18 OCT 2016	Duration: 1 hr

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

Q .1   Is the following matrix diagonalizable? Give reasons   [3]

$$\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$$

Q.2 If $px^3 + qx + r$ has a factor of the form $x^2 + ax + 1, prove\,that\ p^2 = pq + r^2$ [2]

Q.3 Solve the equation $x^4 + 2x^3 - 16x^2 - 22x + 7 = 0$ if $2 - \sqrt{3}$ is one of its roots.

[3]

Q.4 Using Cayley Hamilton Theorem, find $A^{26} - A^{24}$ if A= $\begin{bmatrix} -2 & 4 & 3 \\ 0 & 0 & 0 \\ -1 & 5 & 2 \end{bmatrix}$

[4]

Q.5 Solve the equation
      $3x^4 - 40x^3 + 130x^2 - 120x + 27 = 0$ if

[4]

product of two roots is equal to product of the remaining two.

Q.6 If α, β, γ are the roots of the equation $x^3 + qx + r = 0$, Find $\sum \dfrac{1}{\beta + \gamma}$, $\sum \dfrac{\beta}{\gamma}$ and

$\sum \dfrac{1}{\alpha^2}$ [4]

	MINOR 2		Review Date:
NCU THE NORTHCAP UNIVERSITY	**School of Engineering**		Semester: Odd III Session: July-December
	Programme: MSc (Maths) **Course Name: Regression Analysis** **Course Code : MAL 615**	**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.

1. Consider the following table:

X	1	2	3	4	5	6
Y	10	13	7	22	28	19

The least square estimates from fitting a line to the data points are obtained as $b_0 = 6$ and $b_1 = 3$. Find the following:

i) Standardized Residuals
ii) Studentized Residuals
iii) Press Residuals
iv) R-Studentized Press Residuals

(5Marks)

2. Explain Box-Tidwell Procedure.

(5 Marks)

3. The following data gives the salaries of 6 people in relation to their experience and level of education (graduate or non-graduate).

Experience in years	Salary	Level of Education
2	12000	Non- Graduate
1	10000	Non- Graduate
4	16000	Non- Graduate
3	18000	Graduate
2	15000	Graduate
5	25000	Graduate

i. Fit a suitable regression model.
ii. What is the difference in the salary of a graduate with no experience and a non-graduate with no experience?
iii. What is the difference in increase in salary for each year of experience between a graduate and non-graduate?
iv. What is the expected salary of a graduate with 4 years of experience?
v. What is the expected salary of a non-graduate with 5 years of experience?
(Hint: Not necessary to find inverse of a 4x4 matrix)

(5 Marks)

4. Explain all the sources of multicollinearity.

(5 Marks)

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Date:	Date:
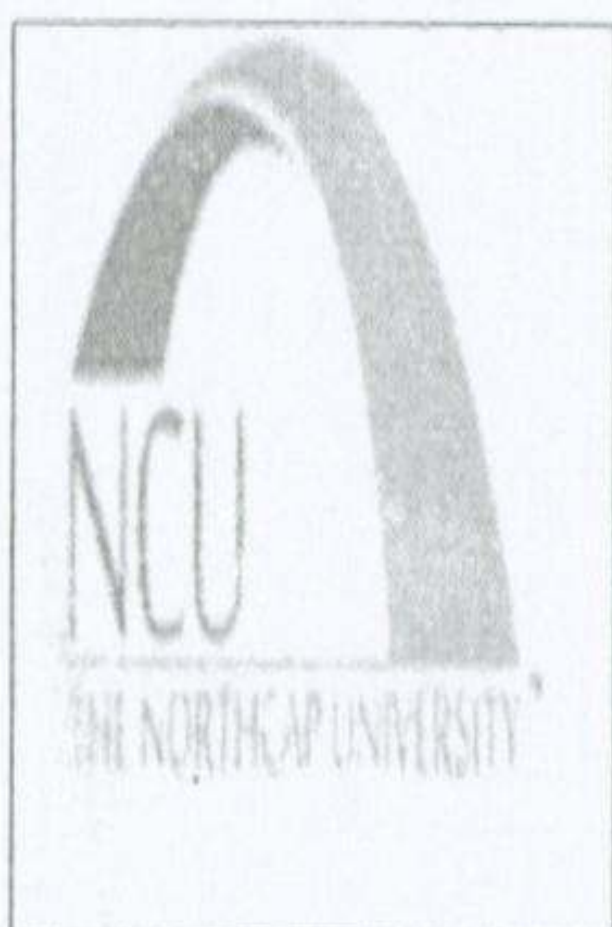
Minor II, October 2016	Review Date:
Applied Sciences	**Semester: Odd/V** **Session: (July-Dec, 2016)**
Programme: BSc (H) Mathematics **Course Name: Mathematical Modeling** **Course Code: MAL-317**	**Maximum Marks: 15** **Duration: 1 hour** **Sheet 1 of 1**

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

1. Explain the Linear Population Growth Model using difference equations and plot x(t) as a function of t where x(0)=200, a=1 and t = 1 to 10. (5)

2. Given the transition between four states p, q, r and s, the transition probability matrix is:

$$\begin{bmatrix} 0 & 0.5 & 0.3 & 0.2 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0.3 & 0.7 & 0 & 0 \end{bmatrix}$$

Draw the weighted graph in between the four states. Also, find which state will reach to its equilibrium position at a much faster rate. (5)

3. Define any two with examples: (2)

   (i) Complete Graph
  (ii) Signed Graph
 (iii) Euler's Theorem

4. Explain Structural Theorem for balance. Also, detect which of the following sigraphs are balanced or unbalanced and find the degree of balance and unbalanced. (3)

	The NorthCap UNIVERSITY	Review Date: 01/03/2014
	Minor-II	**Semester**: Odd
		Session: July-Dec
	School of Engineering and Technology	**Branch**: B.Sc.
NCU THE NORTHCAP UNIVERSITY	**Programme: B.Sc.** **Course Name: Algebra-II** **Course Code: MAL 205** 1 7 OCT 2016	Max. Marks-20 Time: 1 hours

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

Q:1   If $f : G \rightarrow G'$ be a homomorphism, then kerf is a normal subgroup of G.   4
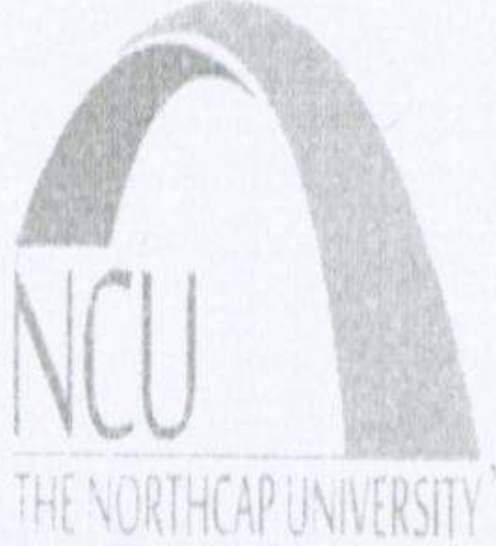
Q:2   If G is a group such that $\dfrac{G}{Z(G)}$ is cyclic, where Z(G) is center of G then Show that G is abelian.   4

Q:3   Define Quotient group and show that every quotient group of a cyclic group is cyclic   1+3

Q:4   State and Prove Lagrange's theorem for finite group G. And show that converse of Lagrange's theorem holds in cyclic groups.   3+2

Q:5   Find the inversion of f where

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 1 & 4 & 3 & 6 & 5 \end{pmatrix}$$ 3

	The NorthCap University	Review Date: 01/03/2014
NCU THE NORTHCAP UNIVERSITY	Minor -2 Test Oct-2016 School of Engineering and Technology	Semester: Odd Session: 2016-2017 Branch: B. Sc (Mathematics) 1st Sem
	Programme: B. Sc (Mathematics) Course Name: Basic Probability Theory Course Code: MAL-105(old)	Sheet-1of 1 Max. Marks-20 Time: 1 hour

NOTE: 1. All questions are compulsory.
2. Marks are mentioned against the question.
3. Table for Normal Distribution is provided.   17 OCT 2016

1. A fair dice is tossed twice. If the number appearing on the top is less than 3, it is a success. Find the probability distribution of successes.   [4]

2. A random variable X has the following probability distribution

X	0	1	2	3	4	5	6	7
P(X)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

(i)   Find k

(ii)   Evaluate P(X<3), P(X<=6), P (0<X<3).   [4]

3. If 10% of the affecting aircrafts are expected to be shot down before reaching the target, what is the probability that out of 5 aircrafts at least 4 will be shot before they reach the target?   [4]

4. A book of 585 pages contains 43 pages with misprints. If these pages are randomly distributed throughout the book, what is the probability that 10 pages, selected at random will be free from the pages with misprint. Given $e^{-0.735}=0.4795$.   [4]

5. A sample of 100 dry battery cells tested to find the length of life produced gave mean life as 12 hours and standard deviation as 3 hours. Assuming the data to be normally distributed what percentage of battery cells are expected to have life (i) more than 15 hours, (ii) less than 6 hours and (iii) between 10 and 14 hours?   [4]

3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4995	.4995
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4996	.4996	.4996	.4997
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4997	.4997	.4997	.4998
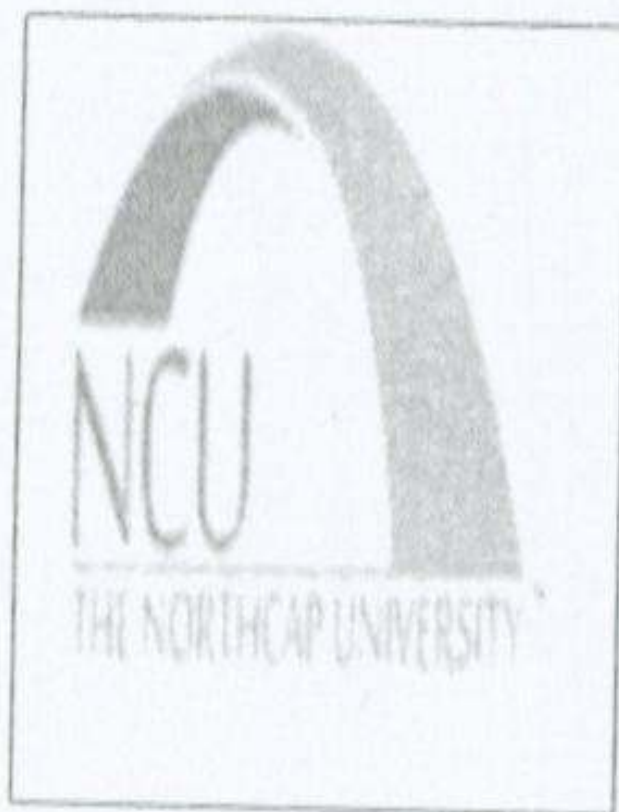
NCU-FRM-29

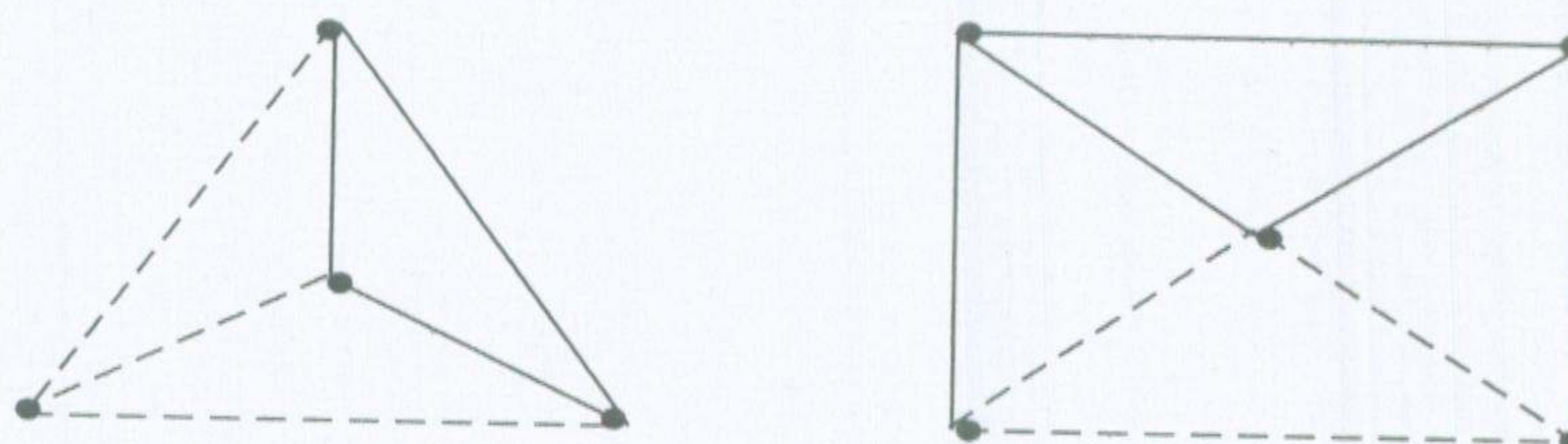|	Minor II, October 2016	Review Date:
	Applied Sciences	Semester: Odd/III
		Session: (July-Dec, 2016)
	Programme: MSc Mathematics	
	Course Name: Mathematical Modeling & Simulation	Maximum Marks: 15
		Duration: 1 hour
	Course Code: MAL-609	
		Sheet 1 of 1

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

1. Define Simulation. Explain in detail its advantages and disadvantages. (4)

2. Given the probability of messages in a communication network:

$$\begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0.5 & 0.3 & 0.2 \\ 0.3 & 0.7 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Draw the network and find which network is highly active. (5)

3. Explain Structural Theorem for balance. Also, detect which of the following sigraphs are balanced or unbalanced and find the degree of balance and unbalanced. (3)

4. Explain any one of the Monte Carlo Techniques for Simulation with example. (3)

	MINOR 2	Review Date:
NCU	**School of Engineering**	Semester: Odd I
THE NORTHCAP UNIVERSITY	**Programme: BSc (H) (Maths)**	Session: July-December
	Course Name: CALCULUS AND ANALYTIC GEOMETRY	Maximum Marks: 40
	Course Code : MAL 101	Duration :1 hr
		Sheet 1 of 1

Note: 1. All questions are compulsory.　　　　　17 OCT 2016
　　　2. Marks are indicated against the questions.

1) Find $\lim_{x \to \infty}\left(x - \sqrt[2]{x^2 + x}\right)$

(3 Marks)

2) Find quadratic approximation of the function $f(x) = \sqrt[2]{x}$ near $x \approx 1$.

(3 Marks)

3) Find the points on the curve $x^2 - y^2 = 1$ that are near to the point (4,0).

(4 Marks)

4) Without solving the equations, show that the equation $x^4 + 2x^3 - 2 = 0$ has one and only real root in the interval (0,1).

(4 Marks)

5) A box with square base and open top is to hold 32 in^3. Find the dimensions that require the least amount of material.

(7 Marks)

6) Suppose a diver dives from a platform of 48 m high from ground. What is the velocity of the diver when he enters the water? Use g=9.8 m/s^2.

(7 Marks)

7) Find the intervals of x values on which the curve $y = x^2 + 4x^{-1}$ is (a) increasing, (b) decreasing, (c) concave up and (d) concave down. Also, find points of inflections, local maximum or local minimum.

(12 Marks)

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Date:	Date:

	NORTH CAP UNIVERSITY	REVIEW DATE: /10/16
NCU THE NORTHCAP UNIVERSITY™	**Minor 2 Test** **School of Engineering & Technology**	**Semester: Odd I** **Session : July to Dec.**
	Programme: MSc Mathematics **Course Name: Complex Analysis** **Course Code :MAL507** 1 7 OCT 2016	**Maximum Marks: 20** **Duration: 1 hr**

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

1. Represent the rational function $R(x) = \dfrac{1}{z(z+1)^2}$ as partial fraction, using the method explained in the class.

------(6)
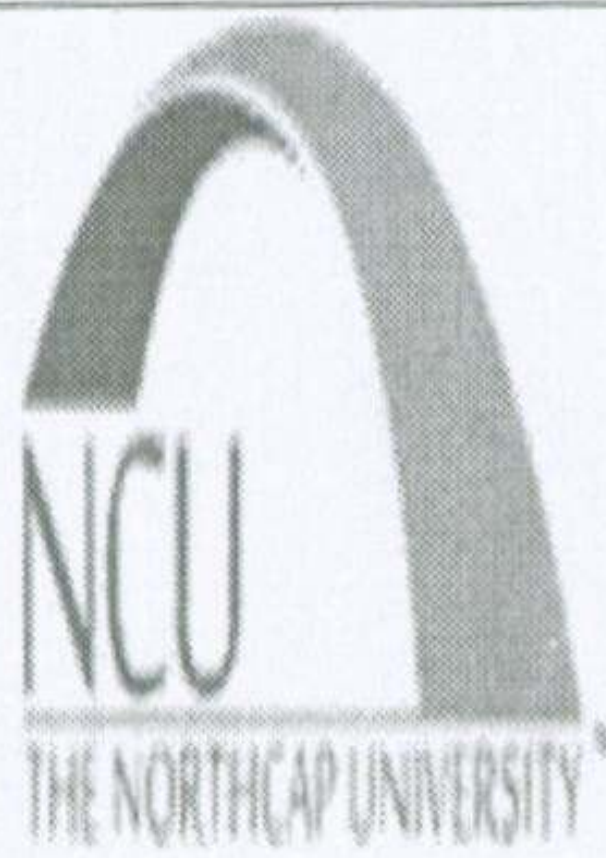
2. Let $f : [a,b] \rightarrow C$ be a complex valued continuous function. Define $\displaystyle\int_a^b f(t)dt$.

(i) Prove that $\left| \displaystyle\int_a^b f(t)dt \right| \leq \displaystyle\int_a^b |f(t)|dt$.

For an arc γ, define $\displaystyle\int_\gamma f(z)dz$. Prove that $\left| \displaystyle\int_\gamma f(z)dz \right| \leq \displaystyle\int_\gamma |f(z)||dz|$.

----(5)

3. Compute $\displaystyle\int_{|z|=2} \dfrac{dz}{(z^2+1)}$

------(3)

4. If $\displaystyle\int_\gamma Pdx + Qdy$ depends only on the end points of γ, for all closed curves γ in Ω, then prove that, there exists a function $U(x,y)$ defined on Ω with partial derivatives $\dfrac{\partial U}{\partial x} = P, \quad \dfrac{\partial U}{\partial y} = Q$.

------(6)

	Minor II, October 2016	Review Date:
NCU THE NORTHCAP UNIVERSITY	School of Engineering and Technology	Semester: Odd/V
		Session: (July-Dec, 2016)
	Programme: BSC(H)	Maximum Marks: 20
	Course Name: Metric Spaces	Duration: 1 hour
	Course Code: MAL-305 15 OCT 2016	
		Sheet 1 of 1

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

1. Prove that in a metric space (X,d), $\overline{A\bigcup B} = \overline{A}\bigcup\overline{B}$, where $A, B \subseteq X$ and verify the same for sub-sets $A = (0,1)$ and $B = \mathbb{N}$ of the set of real numbers under usual metric. (3+2)

2. Find the boundary and frontier of the following sets: (3)

(i) $A = \{\frac{1}{n}; n \in \mathbb{N}\}$ (ii) $B = \{0\}$.

3. Give an example to show that a set which is closed in subspace (Y, d_Y) of (X,d) need not to be closed in (X,d). (2)

4. (a) Define the following and give example for each: (2+2)

(i) Equivalent metrices
(ii) Cauchy sequence

(b) Show that the space $(0, 1]$ with usual metric is not complete. (2)

5. Let (Y,d_Y) be the subspace of (X,d). Show that a subset of Y is d_Y open iff it is the intersection of d open set with Y. (4)
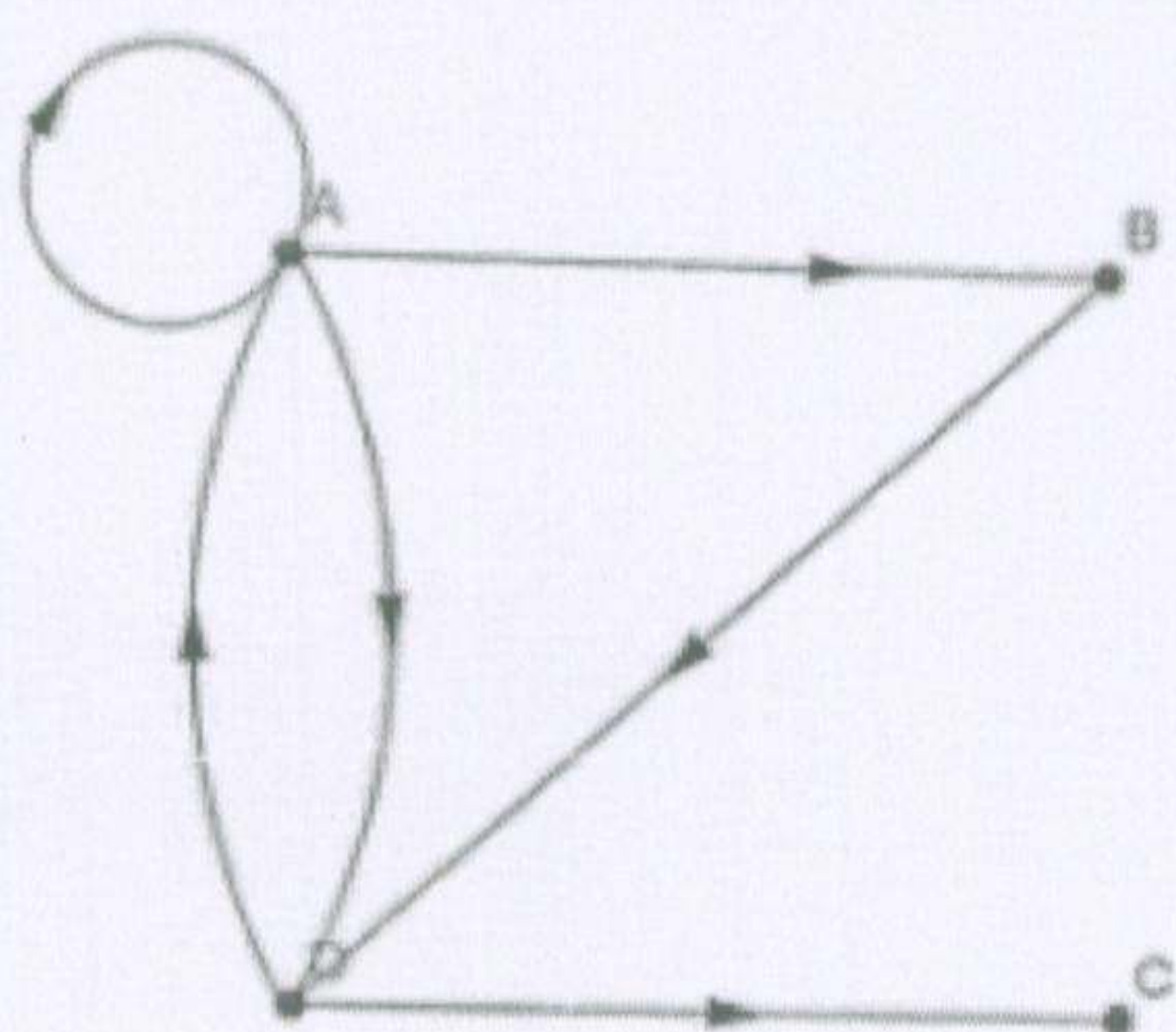
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	MINOR II, October 2016	Review Date:01/03/2014
NCU THE NORTHCAP UNIVERSITY™	School of Engineering and Technology	Semester: Odd Session: 2016-17
	Programme: MSc. Maths Course: Discreet Mathematics and Automata Course Code: MAL 601	Max. Marks: 20 Duration: 1 hour

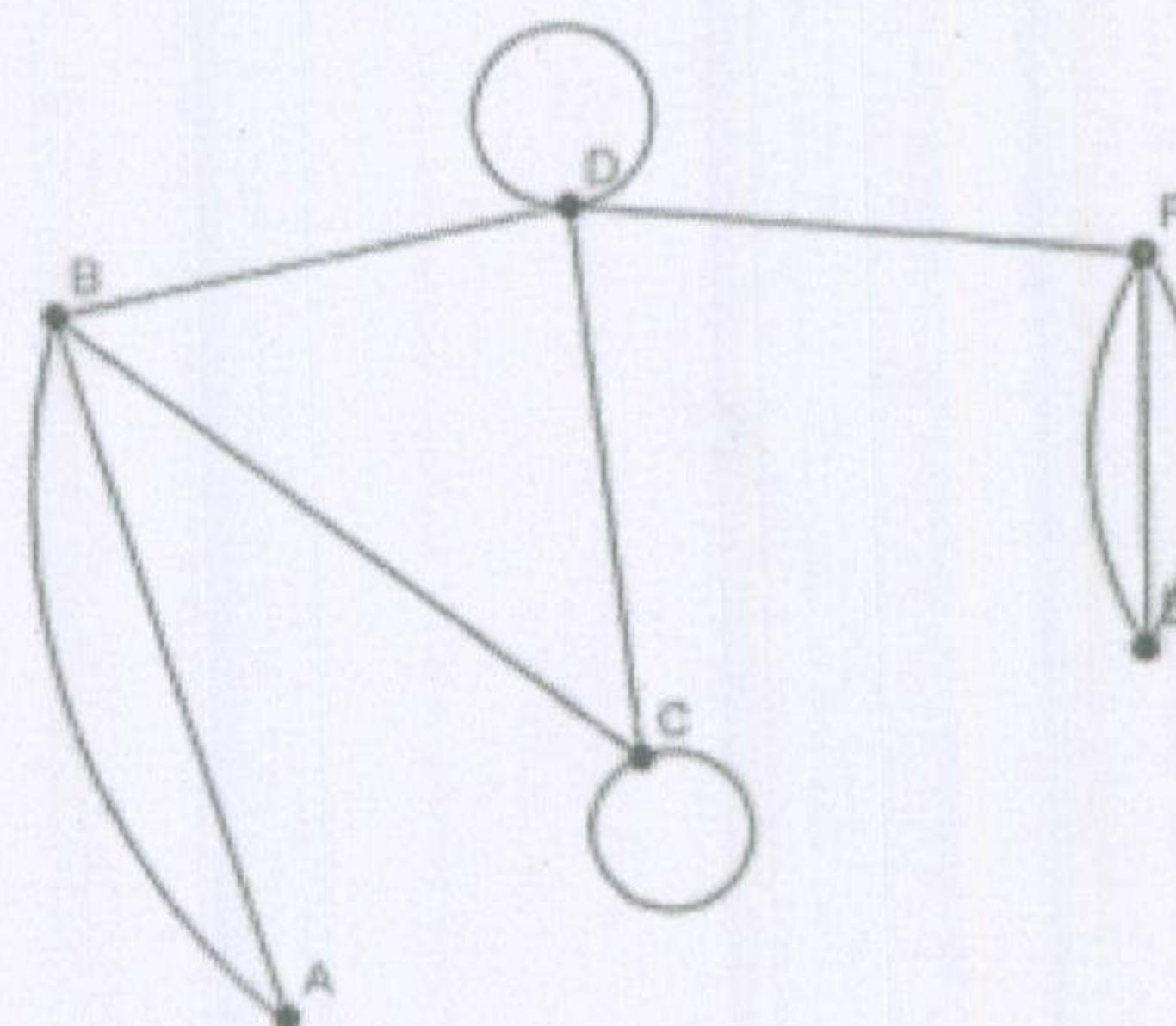| Note: 1. All questions are compulsory. 2. All question carry equal marks. | 15 OCT 2016 |

1. Define complete bipartite graph with example and Draw a complete bipartite graph of K2, 3 and K3, 3

2. Define Adjacency matrix also find the adjacency matrix of the given directed graph
   (i)   (ii)

3. Solve
   a) Use mathematical Induction to prove that $(3^n + 7^n - 2)$ is divisible by 8, for $n \geq 1$
   b) How many ways are there to form a committee, if the committee consists of 3 educationalists and 4 socialist, if there are 9 educationalists and 11 socialist? How many permutations of the letters in ABCDEFGH contain the string ABC.

4. Solve
   a) $6x \equiv 5(\text{mod } 9)$
   b) A single card is drawn from an ordinary pack of 52 cards. Find the probability p that:
      i.   The card is king
      ii. The card is a face card
      iii. The card is a face card and a heart.
      iv. The card is a face card or a heart

5. Prove
   a) Suppose $a \equiv c(\text{mod } m)$ and $b \equiv d(\text{mod } m)$ then prove that $a+b \equiv c+d(\text{ mod } m)$ and $a.b \equiv c.d(\text{mod } m)$
   b) Find the inverse of the matrix $A = \begin{bmatrix} 5 & 3 \\ 4 & 2 \end{bmatrix}$

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	Minor II, October 2016	Review Date:
	School of Engineering and Technology	Semester: Odd-I Session: (July-Dec)
	Programme: MSc (Maths) Course Name: Advanced Linear Algebra 15 OCT 2016 Course Code : MAL501	Maximum Marks:15 Duration :1hr
		Sheet 1 of 1

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

Q.1 If the non-zero vectors $v_1, v_2, \ldots v_n$ are mutually orthogonal, prove that they are linearly independent. **[2]**

Q.2 Prove that rowspace is orthogonal to nullspace for $A_{m \times n}$. Illustrate it with help of **[4]**

$\begin{bmatrix} 1 & 3 \\ 2 & 6 \\ 3 & 9 \end{bmatrix}$. Also draw a diagram which shows the relation between nullspace, rowspace, columnspace and leftnullspace.

Q.3 A matrix of the form $A = \begin{bmatrix} A_{11} & A_{12} \\ 0 & A_{22} \end{bmatrix}$ is said to be block upper-trianglur. Assume that **[3]**

A_{11} is $p \times p$, A_{22} is $q \times q$ and A is invertible. Find the form of A^{-1}.

Q.4 If the non-zero vectors $v_1, v_2, \ldots v_n$ are eigenvectors that correspond to distinct **[2]** eigenvalues $\lambda_1, \lambda_2, \ldots \lambda_n$ of a $n \times n$ non-singular matrix A, then prove that the set $\{v_1, v_2, \ldots v_n\}$ is linearly independent.

Q.5 Let A be an $n \times n$ matrix whose distinct eigenvalues are $\lambda_1, \lambda_2, \ldots \lambda_p$. For $k = 1,2,\ldots p$, **[4]** let β_k be a basis for the eigenspace corresponding to λ_k. Let β be the total collection of vectors that belong to the sets $\beta_1, \ldots \beta_p$. Prove that β is a linearly independent set of vectors in $\Re^n$, and A is diagonalizable if and only if β contains n vectors.

Q4. Sweden's Parliament narrowly approved a contentious law Wednesday that gives authorities sweeping powers to eavesdrop on all e-mail and telephone traffic that crosses the Nordic nation's borders. The right-leaning government's slim majority helped secure 143-138 approval, despite strong opposition from left-leaning parties led by Social Democrats. Supporters argued the law — which takes effect in January — will provide a level of security against potential terrorists plotting attacks.But critics have slammed it as an invasion of privacy and an infringement on civil liberties. Hundreds of protesters gathered outside Parliament Wednesday, some handing out copies of George Orwell's famed "1984," dealing with a fictional police state.

The new powers will give Swedish defense officials the right to scan international phone calls, e-mails and faxes for sensitive keywords without a court order. The companies Swedish telecom TeliaSonera AB and Google Inc. and have called the measure the most far-reaching eavesdropping plan in Europe, comparable to a U.S. government program. After the Sept. 11 attacks, President Bush granted intelligence officers the power to monitor without court approval, international calls and e-mails between people in the United States and suspected terrorists overseas. The Protect America Act, passed last July, extended that authority, but it expired Feb. 15 and a replacement law is being debated.

The Swedish government rejects claims the law will give it unlimited powers to spy on its own citizens and maintains it will filter out domestic communications and is interested only in international traffic.

Four ruling coalition lawmakers forced additions to the bill, hoping the measures would protect individual privacy. But critics said the changes, which included monitoring by independent institutions, don't alter the fundamental problems with the law. "This is just as absurd as before," said Per Strom of The New Welfare Foundation think tank. "It will still create a society characterized by self-censorship and anxiety." The European Federation of Journalists argued that electronic monitoring of phone and e-mail communications contravenes international and European legal standards. (CO2) **(4 Marks)**

1. The new Swedish law is _____.
    i. seen as a good thing by everyone.
    ii. the brainchild of the ruling Social Democrats.
    iii. causing a lot of controversy.

2. What's the things that opponents of the law are worried about?
    i. Illegal immigration
    ii. The loss of privacy
    iii. The lack of communication between political parties

3. Who will oversee the process to make sure that individual privacy is protected? 1
    i. Independent organizations
    ii. A special government organization
    iii. No one

4. According to the article, do any other countries in Europe have similar eavesdropping laws?
    i. Yes
    ii. No
    iii. The article doesn't say

Issued by:	Approved by:
Date:	Date:

	Question Paper for Minor Test II		Review Date:
NCU THE NORTHCAP UNIVERSITY®	Centre for Languages Learning		Semester: Odd/ III Session: (July-Dec. 2016)
	Programme: B.Com (Hons) Course Name: Business Communication Course Code :CLL100	17 OCT 2016	Maximum Marks: 30 Duration : 60 mins
			Sheet 1 of 1

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

Course Outcomes :

CO 1. Demonstrate the use of basic and advanced writing techniques that today's technology demands
CO 2. Exhibit excellence in reading ,writing, listening and speaking skills
CO 3. Apply the principles of letter writing to technical and business correspondence
CO 4. Demonstrate clarity, precision, conciseness and coherence in the use of language while preparing presentations

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Q1. a) Do our non-verbals govern only how other people think and feel about us? **(2 marks)(CO1)**
    b) What are some characteristics that a person practicing power poses tends to exhibit? **(2 marks)(CO1)**

Q2. Write short notes on the following :
    a) Characteristics of a Report in brief.   (50-60 words)   **(4 marks) (CO2)**
    b) Types of long reports.   **(3 marks) (CO2)**

Q3. Write an inquiry letter to HCL about 50 laptops that your organization wants to purchase. Invent the necessary details.   **(8 marks) (CO3)**

Q4. Draft a memo to an employee of your company who has violated a rule in your organization.
                                                                             (6 marks) (CO4)

Q5. Re-write the following sentences correctly :   **(5 marks (CO2)**

    a) Casper and Jane is at the apartment.
    b) Either her trouser or her shirt are under the bed.
    c) Conan along with the team want to win the tournament.
    d) Neena and Bobby doesn't know the answer.
    e) The newspaper, including the magazine section, are on the coffee table.

Issued by:	Approved by:
Date:	Date:

	Question paper for Minor Test II	Review Date:
NCU THE NORTHCAP UNIVERSITY	**Centre for Languages Learning** Programme: B-Tech/M-Tech Course Name: French I for Engineers Course Code : CLL 200 19 OCT 2016	Semester: Odd III, VII Session: Jul- Dec, 2016
		Maximum Marks: 30 Duration : 60 mins
		Sheet 1 of 1

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

Course Outcomes :

CO 1. Les étudiants seront capable de : se présenter et présenter quelqu'un – demander et donner des informations personnelles (nom/prénom..) compléter un formulaire de renseignements – dire le numéro de téléphone et demander l'heure – comprendre un court article sur internet.

CO 2. Parler de ses activités quotidiennes et de ses loisirs– lire une petite annonce avec date et heure, parler des professions.

CO 3. Formuler un projet / des questions– proposer et organiser une sortie – laisser un message sur un répondeur – demander / dire une direction - lire un plan.

CO 4. Commander et payer un repas dans un restaurant – suggérer et donner des conseils.

1. Ecrivez les verbes correctement.   CO2   2.5 marks

2. Transformez les phrases à la forme négative.   CO1   2.5 marks
1. Tu ----- la télé. (Regarder)
2. Elle ------ bien. (Chanter)
3. Paul, Jean et moi------au football (jouer)
4. Nous ----- trois langues (parler)
5. Je ------ à mon ami (téléphoner)

3. Complétez avec les verbes : Avoir – Etre   CO1   5 marks
1. Paul ------ deux sœurs.
2. Tu ------ un grand chien (dog)
3. David -----docteur
4. Je ne ------pas anglaise
5. ---- vous d'ici ?
6. Albert et Suzanne ------ des amis.
7. ----- _ elles riches ou pauvres ?
8. Ils ----- deux motos.
9. Bernadette et Jean -----un grand appartement.
10. Tu ---- très beau aujourd'hui.

4. Trouvez les questions.   CO3   2 marks
1. Pierre part au Canada.   2. Je pars lundi matin.

	Question Paper for Minor Test II	Review Date:
	Centre for Languages Learning	Semester: Odd/ III, VII/III, V Session: July-Dec. 2016
	Programme: B-Tech/M-Tech Course Name: German I (All Schools) Course Code : CLL 220 19 OCT 2016	Maximum Marks: 30 Duration : 60 mins
		Sheet 1 of 1

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

Kursendergebnisse (Course Outcomes): Am Ende des Kurses können die Studenten-

CO 1. einfache Sätze und alltägliche Ausdrücke verstehen und verwenden.

CO 2. sich und Andere vorstellen, die Leute ganz einfache Fragen stellen, z.B., wo sie wohnen, wen sie kennen, was sie besitzen usw.

CO 3. auf einfache Art kommunizieren, die Themen können verschieden sein, z.B., Familie, was ihnen schmecken/gefallen, was nicht, Essen in einem Restaurant bestellen, ein Telefongespräch annehmen, jemanden einladen, eine einfache E-Mail schreiben

1. **Wie viel Uhr ist es? (privat)**   (8 Marks)   (CO 3)

    a) 15.00 Uhr
    b) 7.30 Uhr
    c) 9.45 Uhr
    d) 18.40 Uhr
    e) 22.10 Uhr
    f) 17.15 Uhr
    g) 6.25 Uhr
    h) 10.35 Uhr

2. **Ergänzen Sie die trennbaren Verben in der richtigen Form!**   (8 Marks)   (CO 1)
   (fernsehen, anfangen, zurückfahren, anrufen)

    a) Marion: Wann _____ du nach Hause?
       Tina: Um 13.30 Uhr ist die Schule aus. Ich _____ so gegen 13.40 Uhr nach Hause.

    b) Karin: _____ Stefan dich jeden Tag?
       Tina: Nein, er _____ mich maximal zweimal pro Woche.

    c) Jörg: Von wann bis wann _____ ihr, Nina und Brigitte?
       Nina und Brigitte: Wir _____ von 18.00 Uhr bis 19.00 Uhr.

    d) Birgit: _____ der Deutschunterricht um 8.00 Uhr?
       Andreas: Ja, er _____ um acht.

3. **Ergänzen Sie die Modal Verben in der richtigen Form!** (5 Marks) (CO 3)
   (können, möchten, dürfen)

   a) Man _____ hier nicht rauchen. Bitte rauchen Sie hier nicht!
   b) _____ Sie mir helfen?- Ich _____ mit Frau Weber sprechen.
   c) Was _____ du trinken, Tina?- ich _____ Eistee trinken.

4. **Lesen Sie die Anzeige und kreuzen Sie die richtige Antwort an!** (4 Marks) (CO 1)

Jugendzentrum *Juze* **für alle von 6-18 Jahren** **Montag- Freitag-** 14.00-21.00 Uhr: Musik hören, Spiele, Internet Café, Bibliothek. **Samstag-** Disko; **Montag-** 14.30-17.30: Spielen für 6-10-jährige **Dienstag-** 14.00-16.00: Hilfe bei den Hausaufgaben **Informationen** 05425 1659

   a) Das Juze ist offen- **nur am Vormittag/ am Nachmittag und am Abend/ nur am Nachmittag.**
   b) Das Juze ist **nur für Kinder/ für Kinder und Jugendliche/ nür für Mädchen.**
   c) Was kann man machen?- **Bücher kaufen/ spielen und lesen/ Musik machen.**
   d) Das Juze ist geschlossen- **am Sonntag/ am Mittwoch und am Donnerstag/ am Mittwoch.**

5. **Ergänzen Sie die Artikel!** (5 Marks) (CO 2)

   Mein Haus ist groß. Es hat vier Zimmer, _____ Küche, _____ Bad und _____ Flur. Im Wohnzimmer sind _____ Sofa, drei Sessel und _____ Tisch. Im Arbeitszimmer habe ich _____ Schreibtisch und _____ Computer. In meinem Schlsfzimmer gibt es _____ Bett und _____ Regal.

   Leider habe ich _____ Garten.