Rai University
EVOLVING THINKING MINDS
A LEADING RESEARCH DRIVEN UNIVERSITY

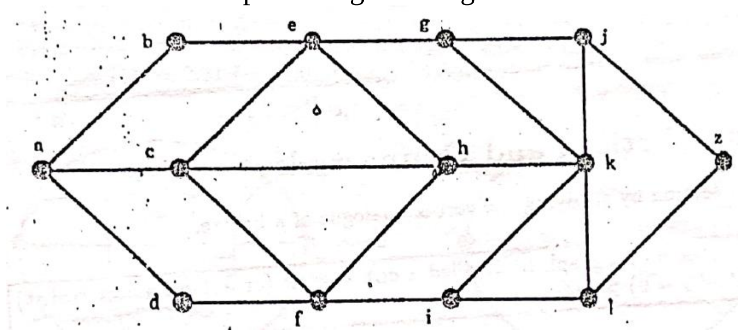
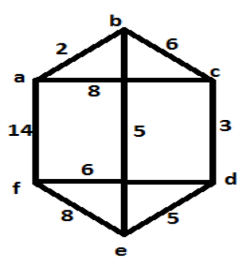
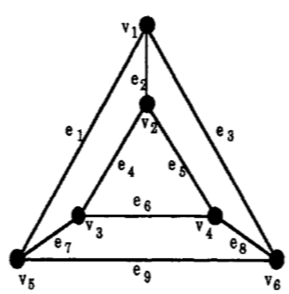
School of Arts, Science and Commerce
Department of Science
B.Sc. Mathematics
Semester VI Major Assignment

Important Instructions to Student:

1. Last date for Assignment Submission – **30-May-2020**
2. This assignment carries major **weightage of 50 Marks**. Kindly prepare it very carefully and in a very detailed manner. For any help in this regard, kindly contact your faculties.
3. Front Page of Assignment should clearly include details like:
   a. Your Name
   b. UID Number
   c. Subject
   d. Class
   e. Semester

   In the event of no such information, we may not be able to assign marks for your assignment, for which responsibility lies with students.
4. You can write and submit assignment through any of the following options:
   a. Handwritten Assignment – Prepare softcopy of your assignment through suitable apps and send the assignment as one PDF to your respective faculty as mentioned above.
   b. Typed Assignment – Prepare Assignment with following font setting and submit the assignment to your respective faculty as mentioned above.
      i. Font Type – Times New Roman or Arial
      ii. Headings – Font Size 14
      iii. Text (Except Heading) – 12
      iv. Normal Margin and Line Spacing maximum 1.15
5. After this lockdown ends, you all have to submit the physical assignment copies to your respective Faculties. So, keep the assignment carefully for submission.
6. While submitting assignment through email, kindly use subject line as Name of the Programe_Name of Course/Branch_Semester_Name o the the Subject. For Example B.Tech._Mechanical_IV_Theory of Machines

REAL ANALSIS **Prof: Vardan Parmar**	**Mode of Submission : Email** **Email** – vardan.parmar@raiuniversity.edu **Subject Line:** B.Sc. SEM VI Real analysis
1.	State and prove Archimedean property
2.	Find limit of the function using definition. $\lim_{x \to a} \left(\frac{x+1}{x+2}\right)$
3	Stat and Prove that Weierstrass Completeness Principle.
4	Let $\lim_{x \to c} f(x) = L_1$ and $\lim_{x \to c} g(x) = L_2$ then prove that $\lim_{x \to c}\big(f(x) \pm g(x)\big) = L_1 \pm L_2$, and $\lim_{x \to c}\big(f(x).g(x)\big) = L_1 \cdot L_2$
5.	Define the set $a + S := \{a + s : s \in S\}$. prove that $Sup(a + S) = a + sup\ S$
TOPOLOGY II **Prof: Vardan Parmar**	**Mode of Submission : Email** **Email** – vardan.parmar@raiuniversity.edu **Subject Line:** B.Sc. SEM VI Topology
1.	Prove that 1. Arbitrary intersection of closed set is closed. 2. Finite union of closed set is closed.
2.	Write in detail about types of topology.
3.	Show that intersection of any two topology on X is always a topology on X.
4.	Let $\mathfrak{B}$ be a basis of a nonempty set X. $T = \{U \subset X : for\ every\ x \in U\ there\ exist\ B \in \mathfrak{B}\ such\ that\ x \in B \subset U\}$. Prove that T is a topology on X.
5.	Prove that every simple ordered set is a T_2 space in the order topology.
COMPLEX ANALYSIS **Prof: Anjali Ladva**	**Mode of Submission : Email** **Email** – anjali.ladva@raiuniversity.edu **Subject Line:** B.Sc. SEM VI Complex Analysis
1.	Stat and prove triangle inequality.
2	Prove that the set of values of $\log(i^2)$ is not the same as the set of values $2\log i$.
3.	Prove that: (I) $cosh^2x - sinh^2x = 1$ (II) $\sin ix = i\ sinh\ x$
4.	1. Show that $f(z) = u(x,y) + iv(x,y)$, $z_0 = x_0 + iy_0$, and $w_0 = u_0 + iv_0$ Then $\lim_{z \to z_0} f(z) = w_0$ $if\ and\ only\ if$ $\lim_{(x,y)\to(x_0,y_0)} u(x,y) = u_0$ and $\lim_{(x,y)\to(x_0,y_0)} v(x,y) = v_0$
5.	Find the general value of $\log(1+i) + \log(1-i)$.
ABSTRACT ALGEBRA II **Prof: Vardan Parmar**	**Mode of Submission : Email** **Email** – vardan.parmar@raiuniversity.edu **Subject Line:** B.Sc. SEM VI Abstract algebra II
1.	Prove that a finite integral domain is field.
2.	Let $\mathbb{Q}(\sqrt{2}) = \{a + b\sqrt{2}\ \vert a, b \in \mathbb{Q}\}$. Show that $\mathbb{Q}(\sqrt{2})$ is Commutative ring with unity under usual addition and multiplication.

3.	If a commutative ring R with unity has no proper ideal, then R is a field.
4.	Examine which of the following subset of the ring $(\mathbb{R};+;\cdot)$ are subrings. (i) $U=\{m+n\sqrt{5}\mid m,n\in\mathbb{Z}\}$ (ii) $U=\{m+n\sqrt[2]{3}\mid m,n\in\mathbb{Z}\}$ (iii) $U=\{a/5^t \mid a\in\mathbb{Z}\ and\ t\in\mathbb{N}\}$
5.	Obtain the quotient $q(x)$ and remainder $r(x)$ on dividing $f(x)=3x^3+2x^2+x+1$ by $g(x)=x^2+3x+2$.
GRAPH THEORY **Prof: Anjali Ladva**	**Mode of Submission : Email** **Email** – anjali.ladva@raiuniversity.edu **Subject Line:** B.Sc. SEM VI Graph Theory
1.	Write the fusion algorithm for connectedness.
2.	Find $a-z$ shortest path using BSF Algorithm. 
3.	Apply Kruskal's Algorithm to get a minimal spanning tree in graph G. 
4.	Write down the adjacency matrix and the incidence matrix for the graphs Figure using the ordering of the vertices And edges given. 
5.	Explain Kruskal's Algorithm.

NOTE: After completing your assignments, contact your respective faculty member and submit the assignment for assessment.