Disusun oleh*(Prepared by)*	**Diperiksa oleh** *(Checked by)*	**Disetujui oleh** *(Approved by)*	**Tanggal Validasi** *(Valid date)*
Aan Restu Mukti , M.Kom., CCNA	**Alek wijaya, S.Kom., M.I.T**	**Dedy Syamsuar, M.I.T., Ph.D.**	

1. Fakultas *(Faculty)* : Ilmu Komputer
2. Program Studi *(Study Program)* : Teknik Informatika   Jenjang *(Grade)* : S1
3. Mata Kuliah *(Course)* : Jaringan Komputer: *Routing & Switching*   SKS *(Credit)* : 4   Semester*(Semester)* : 3
4. Kode Mata Kuliah *(Code)* : 1421316   Sertifikasi *(Certification)* : √ya/*(yes)*   Tidak*(No)*
5. Mata Kuliah Prasyarat *(Prerequisite)* : -
6. Dosen Koordinator *(Coordinator)* : Aan Restu Mukti , M.Kom., CCNA.
7. Dosen Pengampuh *(Lecturer)* : 1. Aan Restu Mukti , M.Kom., CCNA   √ Tim*(Team)*   Mandiri *(Personal)*
   2. Chairul Mukmin, M.Kom., MTCNA

8. Capaian Pembelajaran Mata Kuliah (*Course Learning Out comes*) :

Capaian Pembelajaran Lulusan (CPL)	CPL 01	Memiliki kemampuan untuk menganalisis dan merancang kebutuhan pengguna untuk pengembangan sebuah system
	CPL 08	Memiliki kemampuan untuk memahami dan menganalisa persoalan computing untuk menyelesaikan masalaht
	CPL 09	Memiliki kemampuan untuk menerapkan pengetahuan ilmu komputer menggunakan algoritma/ metode yang relevan
Capaian Pembelajaran Mata Kuliah (CPMK)	CPMK013	Mampu merancang sistem untuk kebutuhan pengguna
	CPMK082	Mampu menganalisa persoalan computing untuk menyelesaikan masalah
	CPMK091	Mampu memilih algoritma/ metode yang relevan
	CPMK092	Mampu menerapkan algoritma/ metode yang relevan

SUB-CPMK0131-024	Configure a router to route between multiple direcly connected networks
SUB-CPMK0132-024	Explain how static routes areimplemented in a small to medium-sized businessnetwork.
SUB-CPMK0821-024	Configure static routes toenable connectivity in a small to medium-sized businessnetwork
SUB-CPMK0822-024	Explain the function of dynamic routing protocols
SUB-CPMK0911-024	Implement RIPv2
SUB-CPMK0912-024	Explain how switched networks support small tomedium-sized businesses, Explain how Layer 2 switches forward data in a small to medium-sized LAN.
SUB-CPMK0921-024	Implement DHCPv4 to operateacross multiple LANs in a small to medium-sizedbusiness network
SUB-CPMK0922-024	Explain how NAT providesIPv4 address scalability in a small to medium-sized business network.
SUB-CPMK0923-024	Use discovery protocols tomap a network topology, Configure NTP and Syslogin a small to medium-sized business network

Matriks Sub-CPMK terhadap CPL dan CPMK	SUB-CPMK	CPL01	CPL08	CPL09	
		CPMK013	CPMK82	CPMK091	CPMK092
	SUB-CPMK0131-024	✓			
	SUB-CPMK0132-024	✓			
	SUB-CPMK0821-024		✓		
	SUB-CPMK0822-024		✓		
	SUB-CPMK0911-024			✓	
	SUB-CPMK0912-024			✓	
	SUB-CPMK0921-024				✓
	SUB-CPMK0922-024				✓
	SUB-CPMK0923-024				✓

9. Deskripsi Mahasiswa

Deskripsi Singkat Mata Kuliah	Algoritma dan pemrograman merupakan mata kuliah yang membahas konsep-konsep dasar algoritma dan pemrograman prosedural. Konsep algoritma dan pemrograman tersebut diimplementasikan dalam beberapa bahasa pemrograman dan akan digunakan untuk menyelesaikan permasalahan sederhana. Topik-topik yang dibahas meliputi: dasar algoritma, pembuatan algoritma, tipe data, variabel, struktur I/O, operator, perulangan, struktur control, Fungsi(metoda) dan prosedur, Array, manipulasi string, rekursif, GUI dan event driven. Sistem pengajaran yang dilakukan meliputi tutorial, responsi dan praktikum yang terjadwal

10. Bahan Kajian

Bahan Kajian (Materi Pembelajaran)	a. Routing Concepts b. Static Routing c. Static Routing Project d. Dynamic Routing e. Dynamic Routing Project f. Switched Networks g. Switch Configuration h. Switch Configuration Project i. VLANs j. VLANs Project

	k. Access Control Lists
	l. Access Control Lists Project
	m. DHCP
	n. DHCP Project
	o. NAT for IPv4
	p. NAT for IPv4 Project
	q. Device Discovery,Management, andMaintenance

11. Implementasi Pembelajaran Mingguan *(Implementation Process of weekly learning time)*

Minggu	Sub CPMK (Kemampuan akhir yang direncanakan)	Bahan Kajian/Materi Pembelajaran *(Study Material)*	Bentuk dan Metode Pembelajaran [Estimasi Waktu] *(Learning Method)*	Sumber Belajar *(Learning Resource)*	Penilaian		
					Indikator *(Indicator)*	Kriteria & bentuk	Bobot
1	• Configure a router to route between multiple direcly connected networks. • Explain how routers use information in data packets to make forwarding decisions in a small to medium sized business network.	1. Router Initial Configuration 2. Routing Decisions 3. Router Operation	Kuliah dan Diskusi (Luring) Tatap Muka [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep Routing Concepts [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2]	1. Menjelaskan Konsep Routing Protokol 2. Memberikan gambaran cara kerja routing dalam jaringan	**Kriteria** :Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	5%
2	• Explain how static routes are implemented in a small to medium-sized business network.	1. Implement Static Routes	Kuliah dan Diskusi (Daring) Elearning [TM:1x(3x50")] Tugas : Menjelaskan ringkasan Static Routing [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2]	Memberikan Penjelasan Tentang StaticRouting pada skala kecil dan menengah	**Kriteria** :Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	5%
3	• Configure static routes to enable connectivity in a small to medium-sized businessnetwork. • Troubleshoot static and default route configurations.	2. Configure Static and Default Routes 3. Troubleshoot Static and Default Routes	Kuliah dan Diskusi (Luring) Tatap Muka [TM:1x(3x50")] Tugas : Menjelaskan ringkasan Static	BUKU REFERENSI: [1], [2]	Memberikan penjelasan tentang cara konfigurasi Static Routing	**Kriteria** :Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	5%

			Routing Project [PT+BM: (1+1)x(3x60")]				
4	• Explain the function of dynamic routing protocols. • Determine the route source, administrative distance, and metric for a given route *** Pertemuan ke 4 ini Akan di isi oleh Partisi***	1. Dynamic Routing Protocols 2. The Routing Table	Kuliah dan Diskusi (Daring) Elearning [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep Dynamic Routing [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2]	1.Menjelaskanfungsi Protokol Routinng Dinamis 2.Menjelaskanatribut dari Routing ProtokolDinamis	**Kriteria** :Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	5%
6	Implement RIPv2 *** Pertemuan ke 4 ini Akan di isi oleh Partisi***	RIPv2	Kuliah dan Diskusi (Daring) Elearning [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep Dynamic Routing Project [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2]	Menjelaskan cara kerja dankonfigurasi RIPv2	**Kriteria** :Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	5%

| 7 | • Explain how switched networks support small to medium-sized businesses
• Explain how Layer 2 switches forward data in a small to medium-sized LAN.
• Configure basic switchsettings to meet network requirements.
• Configure a switch using security best practices in a small to medium-sized businessnetwork | • LAN Design
• The Switched Environment
• Basic Switch Configuration
• Switch Security | Kuliah dan Diskusi (Luring)
Tatap Muka
[TM:1x(3x50")]
Tugas :
Menjelaskan ringkasan konsep Switched Networks
[PT+BM: (1+1)x(3x60")] | BUKU REFERENSI: [1], [2] | • Menjelaskan tentang Perancangan Jaringan Skala Kecil dan Menengah
• Menjelaskan konsep Layer 2 pada
• jaringanMenjelaskan basic konfigurasi switch dan ketentuan apa yang bisa diterapkan
• Menjelaskan dan mendemokan cara konfigurasi keamanan pada switch | **Kriteria** :Ketepatan dan penguasaan
Bentuk : Tugas 1 Kuis | 5% |
| 8 | Configure basic switch and security | 1. Basic Switch Configuration
2. Switch Security | Kuliah dan Diskusi (Daring)
Elearning
[TM:1x(3x50")]
Tugas :
Menjelaskan ringkasan konsep Switch Configuration Project [PT+BM: (1+1)x(3x60")] | BUKU REFERENSI: [1], [2] | Mampu konfigurasi switch dan mampu menerapkan keamanan pada switch | **Kriteria** :Ketepatan dan penguasaan
Bentuk : Tugas 1 Kuis | 10% |

9	• Explain how VLANs segment broadcast domains in a small to medium-sized business network • Implement VLANs to segment a small to medium-sized business network. • Configure routing between VLANs in a small to medium-sized business network.	• VLAN Segmentation • VLAN ImplementationsInter-VLAN • Routing UsingRouters	Kuliah dan Diskusi (Luring) Tatap Muka [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep VLANs [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2] Penelitian : OPTIMASI NETWORK BERBASIS MULTI VLAN (VIRTUAL LOCAL AREA NETWORK) (http://eprints.binadarma.ac.id/3946/)	• .Menjelaskan bagaimana vlan mampu mengurangi broadcast domain • Mendemokan penerapan VLAN untuk skala kecil dan menengah • Mendemokan penerapan VLAN dengan beberapa segmen	**Kriteria :**Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	10%
			UTS				
11	• Explain the purpose and operation of ACLs in small to medium-sized business networks • Configure standard IPv4 ACLs to filter traffic in a small to medium-sized businessnetwork. • Troubleshoot IPv4 ACLissues	• ACL Operation • Standard IPv4 • ACLs Troubleshoot ACLs	Kuliah dan Diskusi (Daring) Elearning [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep Access Control Lists [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2] PENELITIAN: THE SIMULATION OF ACCESS CONTROL LIST (ACLS) NETWORK SECURITY FOR FRAME RELAY NETWORK AT PT. KAI PALEMBANG (https://ojs.unud.ac.id/index.php/lontar/article/view/46823)	• Mahasiswadapat mengetahui tujuan dari ACL • Mahasiswadapat membuat Policy denganACL IPv4 • Mahasiswa mampu menyelesaikan permasalahan yang mungkinterjadi dalam penerapan ACL IPv4	**Kriteria :**Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	10%

12	• Implement DHCPv4 to operate across multiple LANs in a small to medium-sizedbusiness network. • Implement DHCPv6 to operate across multiple LANs in a small to medium-sizedbusiness network.	1. DHCPv4 2. DHCPv6	Kuliah dan Diskusi (Luring) Tatap Muka [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep DHCP [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2]	1.Menjelaskan cara kerja DHCPv4 dan mampu menerapkan 2. Menjelaskan cara kerja DHCPv6 dan mampu menerapkan Mampu menerapkan DHCPv4 dan DHCPv6	**Kriteria :**Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	10%
13	1. Explain how NAT providesIPv4 address scalability in a small to medium-sized business network. 2. Configure NAT services on the edge router to provide IPv4 address scalability in a small to medium-sizedbusiness network 3. Troubleshoot NAT issues in a small to medium-sized business network	•NAT Operation •Configure NAT •Troubleshoot NAT	Kuliah dan Diskusi (Luring) Tatap Muka [TM:1x(3x50")] Tugas : Menjelaskan ringkasan konsep NAT for IPv4 [PT+BM: (1+1)x(3x60")]	BUKU REFERENSI: [1], [2] PENELITIAN : The Simulation Of Access Control List (Acls) Network Security For Frame Relay Network At PT. KAI Palembang (Lontar - Template (ristekdikti.go.id))	• Menjelaskan bagaimana cara kerja NAT dalam jaringan • Menjelaskan cara konfigurasi NATv4 • Mampu menyelesaikan permasalahan yang terjadi pada NATv4 • Mampu Konfigurasi NAT untukIPv4 • Mampu Memperbai ki dan menyelesaikan permasalahndalam penerapan NAT	**Kriteria :**Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	10%

14-15	- Use discovery protocols tomap a network topology - Configure NTP and Syslogin a small to medium-sized business network - Maintain router and switch configuration and IOS files	- Device Discovery - Device Management - Device Maintenance	Kuliah dan Diskusi (Daring) Elearning [TM:1x(6x50")] Tugas : Menjelaskan ringkasan konsep Pendahuluan Device Discovery, Management, and Maintenance [PT+BM: (1+1)x(6x60")]	BUKU REFERENSI: [1], [2]	1. Memberikan pemahaman akan cara pemulihan dalam jaringan2. Menjelaskan gambaran tentang konsep NTPdan Syslog 3. Memberikan pemahaman tentang prosedur perbaikanmasalah	**Kriteria :**Ketepatan dan penguasaan **Bentuk :** Tugas 1 Kuis	10%
UAS							

12. Pengalaman Belajar Mahasiswa *(Student Learning Experiences)*

Survei : Mahasiswa merasa sangat terbantu disaat turun kedunia industri, dimana mahasiswa sudah terbiasa menggunakan peralatan jaringan yang biasa digunakan di dunia kerja.

13. Kriteria dan Bobot Penilaian *(Criteria and Evaluation)*

CPL	CPMK	MBKM	Observasi (Praktek)	Unjuk Kerja (Presentasi)	Tes Tertulis		Tes Lisan (Tgs Kel)
					UTS	UAS	
CPL01	CPMK013		✓				
CPL08	CPMK082				✓		
CPL09	CPMK091					✓	
	CPMK092						✓

CPL	CPMK	Tahap Penilaian	Teknik Penilaian	Instrumen	Kriteria	Bobot
CPL01	CPMK013	Setelah UTS	Observasi (Praktek)	Rubrik	Hasil Praktek	20%
CPL08	CPMK082	Ujian Tengah Semester	Tes Tertulis (UTS)	Rubrik	Kelengkapan Jawaban	30%
CPL09	CPMK091	Akhir Semester	Tes Tertulis (UAS)	Rubrik	Kelengkapan Jawaban	30%
	CPMK092	Setelah UTS	Tes Lisan (Tgs Kel)	Rubrik	Hasil Tugas	20%

CPL	CPMK	MBKM	Observasi (Praktek)	Unjuk Kerja (Presentasi)	Tes Tertulis		Tes Lisan (Tgs Kel)	Total
					UTS	UAS		
CPL01	CPMK013		20					20
CPL08	CPMK082				30			30
CPL09	CPMK091					30		30
	CPMK092						20	20
Jumlah Total								100

b). Rubrik Penilaian

Kategori	CPMK	Model Soal	Indikator Penilaian				
			Sangat Kurang <55	Kurang ≥ 50 s.d < 65	Cukup ≥ 65 s.d < 75	Baik ≥ 75 s.d < 85	Sangat Baik ≥ 85
UTS	CPMK013	-Menyelesaikan Soal Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs	Mahasiswa sangat tidak mampu menyelesaikan Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs	Mahasiswa tidak mampu menyelesaikan Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs	Mahasiswa cukup mampu menyelesaikan Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs	Mahasiswa mampu menyelesaikan Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs	Mahasiswa sangat mampu menyelesaikan Configure Router,,configures static routes, configure basic switchsettings to meet network require, configure a switch, configure basic switch and security, and configure routing between VLANs
Observasi	CPMK082	-Menyelesaikan soal Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs	Mahasiswa sangat tidak mampu menyelesaikan Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs	Mahasiswa tidak mampu menyelesaikan Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs	Mahasiswa cukup mampu menyelesaikan Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs,	Mahasiswa mampu menyelesaikan Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs,	Mahasiswa sangat mampu menyelesaikan Troubleshoot static and default route configurations, determine the route source, implements RIPv2, Implement VLANs
Tes Lisan	CPMK092	-Menyelesaikan Soal tentang bagaimana how routes make forward	Mahasiswa sangat tidak mampu menyelesaikan	Mahasiswa tidak mampu menyelesaikan	Mahasiswa cukup mampu menyelesaikan	Mahasiswa mampu menyelesaikan tentang bagaimana	Mahasiswa sangat mampu tentang bagaimana how routes

		decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains	tentang bagaimana how routes make forward decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains	tentang bagaimana how routes make forward decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains	tentang bagaimana how routes make forward decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains	how routes make forward decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains	make forward decisions, how static routes are implemented, explain function of dynamic route protocols, how switched networks, how layer 2 switched forward data, how VLANs segment broadcast domains
UAS	CPMK091	-Menyelesaikan Soal explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router	Mahasiswa sangat tidak mampu menyelesaikan explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router	Mahasiswa tidak mampu menyelesaikan explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router	Mahasiswa cukup mampu menyelesaikan explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router	Mahasiswa mampu menyelesaikan explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router	Mahasiswa sangat mampu menyelesaikan explain, configure and troubleshoot, operation of ACLs, Implements DHCPv4 and v6 to operate across multiple LANs, Explain, configure, and troubleshoot NAT provides, services, and issues, use discovery protocols, configure NTP, and maintain router

a. Bobot penilaian

- ≥ 85   = A
- ≥ 70 s.d < 85   = B
- ≥ 60 s.d < 70   = C
- ≥ 50 s.d < 60   = D
- <50   = E

2. Buku Sumber *(References)*

[1]Kurikulum Cisco Networking Academy :https://www.netacad.com/

[2] Mikrotik Artikel : http://mikrotik.co.id/artikel