No	Answer	References (book, slides)
1	What is a “system”?	Set of coherent entities which together act like a big entity. Every element has an effect to other, and vice versa.
2	What is information and what purpose it is needed for?	Needed for the operational capabilities of enterprises (for example: payroll) and for the support of decisions in managerial circles
3	What is an “information system”?	Sum of procedures and activities which store, produce and distribute the required information for administrational and operational duties of the enterprise.
4	Type of Information Systems	Open systems Big and complex systems Manual vs Automatic Data-intensive systems vs Transaction-oriented systems
5	Problem types between Informations Systems and the “real world”	Empirical - observation of the real world Formal level - description of abstraction, structuration or other representation of the gained knowledge Design or development level - the implementation of the formal draft
6	System quality properties -ISO 9126	Functionality, Reliability, Usability, Efficiency, Maintainability, Portability
7	Software Architecture	Consists of components called System, Architecture, Architecture description, View, Point of View, Model, Parties involved.
8	Traditional view of organizations	Strategy< Information, support of decision-making < Enterprise systems, databases, ERP < Services: hardware, network, PCs, e-commerce
9	The Zachman Framework for Enterprise Architectures – „Rows” (Views)	Scope (Contextual) - Enterprise model (Conceptual) - System model (Logical) - Technology model (Physical) - As built - Functioning enterprise OR Planner's view - Owner's - Designer's - Builder's - Integrator's - User's view
10	The Zachman Framework for Enterprise Architectures – „Columns” (Perspectives)	What, How, Where, Who, When, Why OR Data - Function - Network - People - Time - Motivation
11	Properties of TOGAF	The Open Group Architecture Forum High level approach design. Relies heavily on: modularization, standardization, and already existing, proven technologies and products.
12	TOGAF - Enterprise architecture domains	Business architecture, Applications architecture, Data architecture, Technical architecture
13	TOGAF Architecture Development Method (ADM)	Detailed step-by-step process for developing or changing an enterprise architecture. Applied to develop an enterprise architecture which will meet the business and information technology needs of an organization. Tailored to the organization's needs and is then employed to manage the execution of architecture planning activities.
14	Definition (Service)3dj	A service is a change in the condition of a person, or a good belonging to some economic unit, which is brought about as the result of the activity of some other economic unit, with the prior agreement of the former person or economic unit.
15	Service Industries - The services are categorized into	Logistics, Infrastructure, Government, Finance, Entertainment, Business
16	Resource Intensity of Services	Resources are fundamental elements of services. Characterization of services is based on proportion or intensity. Following main types of services have been distinguished according to their resource intensity: • Labor- and capital-intensive services. • Knowledge-intensive service. • Information-intensive service. • Technology-intensive service.
17	Recent development in the domain of services – types of services in service economy	Service Economies, Service-Dominant (S-D) Logic, Electronic Services, Mobile Services, Cloud Services, Service Marketplaces
18	Service-Oriented Societies – characteristics	Intense competition of economies Globalization of worldwide markets Generalization and expansion of information systems and information technologies Significant opportunities for the conception of new specialized services
19	Service-Dominant (S-D) Logic	Recent theoretical contributions, such as S-D Logic, indicate that all markets are centered on the exchange of services, and all economies and societies are service based
20	Definition (Service System)	A service system consists of elements (e.g., people, facilities, tools, and computer programs) that have a structure (i.e., an organization), a behavior (possibly described as a process), and a purpose
21	Operations Management View on Services	Transformation Process One of the basic concepts of OM Activity, or group of activities that • takes one or more inputs, • transforms and adds value to them, • provides output for customers or clients. Input-transformation-output model
22	Services and Goods IHIP criteria	• intangibility, • heterogeneity, • inseparability, • and perishability.
23	Labor- and Capital-Intensive Services	Labor-intensive service: Labor costs outweigh the costs for equipment and materials Capital-intensive service: The capital costs (for facilities, equipment, tools) prevail.
24	Knowledge-intensive services	Mostly used in the form of knowledge-intensive business services. Heavily rely on professional knowledge. Similarly to skills-intensive services. Forms of labor-intensive services
25	Technology-intensive Services	The proportion of labor is very low or zero. Delivered by resources that are purely technological. Can be used in a self-service mode. Technology used in services today is predominantly ICT. ICT and the internet led to concepts like Electronic Services, Web Services, Cloud Services, the Internet of Things, and the Internet of Services.
26	Information-intensive Services	Involve substantial information processing. • Collecting, • manipulating, • interpreting, • and transmitting data to create value. The collection and processing can be automated using information and communication technology (ICT). The amount of data available gets bigger and bigger (Big Data) The task if extracting valuable information becomes more and more sophisticated (data scientist, Big Data analytics)
27	Non-ownership – Outsourcing	giving up resources and demanding them back as a service without ownership is called outsourcing pay for the service only on demand non-ownership gives more flexibility and avoids risks service provider can mitigate risks and handle varying demand

28	IT outsourcing	IT resources of a company are taken over by a third party and provided back to the first company as a service. Cloud services are type of IT outsourcing
29	Hybrid Offering	Goods and services bundling: Companies combine products with services into new offerings with a superior value, for example company offers an extended warranty contract in addition to an electronic product
30	Servitization	for example: companies have added services to their core offerings and services have become a dominant portion of their revenues and profits Servitization is the innovation of an organisation's capabilities and processes to better create mutual value through a shift from selling product to selling product service systems
31	Services in Computer Science	In computer science, "services" and "web services" are terms that describe fundamental programming paradigms. Services are "software components of distinct functional meaning", or "software programs with distinct design characteristics". Web services are "self-describing, self-contained software modules", or "software applications with a published programming interface", and web services "can be sold, too"
32	Evolution of services from two distinct perspectives	Evolution of services can be observed from two distinct perspectives: • As the automation of economic activities and self service. • As the improvement of a programming paradigm.
33	Automation and Self Service - Self Service	Service automation - person delivering the service was replaced by machines Self-service is a direct consequence of service automation Advantages: • no "availability limitations" (e.g., opening hours) • customer has the service encounter completely under his/her own control Computers and ICT (information and communications technology) accelerated the progress of service automation (self-service gasoline stations, ATM, kiosks, electronic ticket machines)
34	Automation and Self Service – Automation	Manufacturing industry - automation of production processes Vending machines - automate the sales process Telephony's modern switching systems - caller directly dial and automatically get routed
35	Face-to-screen service - architectural components	Technology, Customer, (Provider)
36	Electronic Services	An electronic service is a service system (with elements, a structure, a behavior, and a purpose) for which the implementation of many of its elements and behavior is done using automation and programming techniques.
37	Electronic Business Models	**Business-to-Business**: Transactions between two parties where the buyer and seller are both businesses. (ariba.com, salesforce.com) **Business-to-Consumer**: The business offers products or services to consumers rather than other businesses. (Amazon, eBay) **Government-to-Citizen**: Governments are recognizing the value of using electronic services for improving citizens experience and lowering costs.
38	The Value of Electronic Services - Human Touch	Traditional human-based services are characterized by the personal service encounter involving human touch and service experience Provider understands what the customer wants -> deliver a very individual, personalized experience This advantage was lost in automated services Service experience is influenced by the outcomes of the interactions that occur between service systems and their customers
39	The Role of Technology	Technology-free services, Technology-assisted services, Technology-Facilitated Services, Technology Mediated Services, Technology-Generated Services, further classification: • face-to-face or • face-to-screen.
40	The Value of Electronic Services – Personalization	The disadvantage of losing human touch can be overcome with electronic services Provide possibilities to focus on the customer Keywords: personalization, customization, interaction, localization
41	The Value of Electronic Services – Accessibility	Standard internet devices -> using electronic services is very comfortable Can be used from everywhere First - widely accepted - service electronic mail or email Instantaneously delivered
42	E-Service Strategy –Types	According to Hofacker the three types: 1. Complements to existing offline services and goods. (DHL, FedEx, UPS) 2. Substitutes for existing offline services. (Spotify, Netflix, Google Maps) 3. New core services. (Google, Facebook, LinkedIn, Twitter)
43	Developing Electronic Services - web-accessible programs	In software engineering: web-accessible programs are called web applications Residing on the provider's web application server Uses the client's web browser as the presentation layer (client/server) Communicates via standard internet protocols (such as HTTP) Database server is responsible for the persistence of data stored for the web application
44	Service-oriented programming	Subroutines, Components, Business Process Modeling, Service-Oriented Architecture (SOA)
45	Subroutines- Services as Programming Paradigms	Often used functions are isolated from the rest of the code and put it into a subroutine. Can be shared with other developers.
46	Components- Services as Programming Paradigms	Many recurring, separable functions. Extensively reuse preprogrammed object or components. Concept of modules, later evolved into concept of components.
47	Business Process Modeling - Services as Programming Paradigms	Reusable set of services is available. Instead of programming → composing or modeling. Composition of services into business applications is business process modeling (BPM).
48	Service-Oriented Architecture (SOA) - Services as Programming Paradigms	Service-Oriented Architecture (SOA) and Service-Oriented Computing (SOC) are programming paradigms that were introduced to overcome the inflexibility of monolithic software. They utilize services as fundamental elements for developing applications.
49	Resource-based web services	REST (REpresentational State Transfer) web services are resource-based services. Uses the set of well known HTTP operations GET, PUT, POST, DELETE to change states of remote resources. Definition (REST Service): An application-accessible web service that uses REST architectural principles and web specifications as underlying paradigms and technologies, respectively
50	Web Services	The World Wide Web Consortium defines a web service as "a software system designed to support interoperable machine-to-machine interaction over a network".
51	Cloud Services	Web services + provide a technological infrastructure → outsource computing resources as a service (data storage, hardware, servers, networking) "Cloud" indicates that the service is remotely accessed using the internet **Delivery Models**: Software as a Service, Platform as a Service, Infrastructure as a Service **Economies of Scale**: Administration, Infrastructure, Sharing **Characteristics**: On-demand self service, Broad 52network access, Resource pooling, Rapid elasticity, Measured services
52	Operation-based web services technologies	The preferred communication medium is WWW, existing protocols were adopted, new ones were created (HTML, HTTP, XML, WSDL, SOAP, UDDI)

53	Definition (Innovation)	An innovation is the combination of a novelty and its introduction to a market. The novelty can either be newly discovered, or re-used in the context of this innovation.
54	Definition (Service Innovation)	The novelty in a service innovation can be constituted by changes in one or several of the following dimensions: Service concept, customer interaction, value system, business partners, revenue model and organizational or technological service delivery system.
55	Types of Innovation - Henderson and Clark	Analyze innovations along two dimensions: First dimension describes the degree of change in the employed core concepts. Second dimension describes the degree of change in the linkages between these core concepts. The linkages between the core concepts characterize the way in which the concepts are connected to form a new offering. This can include technical interfaces, physical integration, and the connection of different service components. 4 types: Incremental Innovation, Modular innovation, Architectural innovation, Radical innovation
56	Assimilation approach of Service Innovation	The assimilation approach implies that innovation in the manufacturing and in the services domain are, generally speaking, of the same nature and pose comparable challenges to organizations. Consequently, the two phenomena would not have to be studied separately.
57	The demarcation approach of Service Innovation	The demarcation approach represents the extreme opposite opinion. According to this point of view, innovation in goods and innovation in services are entirely distinct and need to be investigated separately, with regard to their challenges, and their supporting methods, processes, etc
58	The synthesis approach of Service Innovation	The synthesis approach introduces the thought of mutual enrichment: In tackling the challenges of innovation in service organizations, one can learn from the rich history of research on manufacturing and industry-based innovation. On the other hand, services and service innovation prominently feature some aspects that might become increasingly important for goods-based innovation, and which might inform management decisions in that domain as well.
59	Janus Cones	They get their name from the ancient Roman god Janus, who is characterized by looking into the future and the past at the same time, and is typically depicted with two faces looking in opposite direction. Similarly, the Janus cones capture past events relevant to one's innovation project, allowing a projection of potential future events and their timing.
60	Context Map	Developed at the Stanford University The context map puts the central topic or opportunity to be addressed by the team in the center, and arranges the relevant dimensions around this topic. By capturing and discussing these dimensions, the problem space defining the team's challenge is properly explored.