

UNIT -I FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

PART-A

1 What is Input/Output channel?

A person's interaction with the outside world occurs through information being received and sent: input and output. In an interaction with a computer the user receives information that is output by the computer, and responds by providing input to the computer – the user's output becomes the computer's input and vice versa. Input in the human occurs mainly through the senses and output through the motor control of the effectors.

2 What are the types of memory or memory function?

(i) Sensory buffers ,(ii) Short-term memory or working memory, (iii) Long term memory

3 What is meant by sensory memory?

The sensory memories act as buffers for stimuli received through the senses. A sensory memory exists for each sensory channel: *iconic memory* for visual stimuli, *echoic memory* for aural stimuli and *haptic memory* for touch. These memories are constantly overwritten by new information coming in on these channels.

4 What is iconic memory?

We can demonstrate the existence of iconic memory by moving a finger in front of the eye. Can you see it in more than one place at once? This indicates a persistence of the image after the stimulus has been removed. A similar effect is noticed most vividly at firework displays where moving sparklers leave a persistent image. Information remains in iconic memory very briefly, in the order of 0.5 seconds.

5 Write brief on existence of echoic memory.

The existence of echoic memory is evidenced by our ability to ascertain the direction from which a sound originates. This is due to information being received by both ears. However, since this information is received at different times, we must store the stimulus in the meantime. Echoic memory allows brief 'play-back' of information.

6 Write short notes on short term memory or working memory.

Short-term memory or working memory acts as a 'scratch-pad' for temporary recall of information. It is used to store information which is only required fleetingly. For example, calculate the multiplication 35×6 in your head. Short-term memory can be accessed rapidly, in the order of 70 ms. However, it also decays rapidly, meaning that information can only be held there temporarily, in the order of 200 ms. Short-term memory also has a limited capacity. There are two basic methods for measuring memory capacity. The first involves determining the length of a sequence which can be remembered in order.

7 What are the two types of long term memory?

- Episodic memory
- Semantic memory

8 State Reasoning. What are the types of reasoning? APRIL/MAY 2017

Reasoning is the process by which we use the knowledge we have to draw conclusions or infer something new about the domain of interest. There are a number of different types of reasoning:

1. deductive ,2.inductive 3.abductive

9 **What is problem solving?**

Reasoning is a means of inferring new information from what is already known, problem solving is the process of finding a solution to an unfamiliar task, using the knowledge we have. Human problem solving is characterized by the ability to adapt the information we have to deal with new situations. However, often solutions seem to be original and creative.

10 **State Gestalt theory.**

Psychology concept is used in training. It proposes that what is 'seen' is what appears to the seer and not what may 'actually be there,' and that the nature of a unified whole is not understood by analyzing its parts. It views learning as a reorganizing of a whole situation in contrast to the behavioral psychology view that learning consists of associations between stimuli and responses. Gestalt experiments show that the brain does not act like a sponge but actively filters, structures, and matches all incoming information against known patterns to make sense of it.

11 **What are the basic levels of skill in Anderson's ACT* model?**

1. The learner uses general-purpose rules which interpret facts about a problem. This is slow and demanding on memory access.
2. The learner develops rules specific to the task.
3. The rules are tuned to speed up performance.

12 **List out all text entry devices.APRIL/MAY 2018**

1.The alphanumeric keyboard,2.Chord keyboards,3.Phone pad and T9 entry,4.Handwriting recognition, 5.Speech recognition.

13 **What are touch screens?**

Touch screens are another method of allowing the user to point and select objects on the screen as they detect the presence of the user's finger, or a stylus, on the screen itself. They work in one of a number of different ways: by the finger (or stylus) interrupting a matrix of light beams, or by capacitance changes on a grid overlaying the screen, or by ultrasonic reflections. The touch screen is very fast, and requires no specialized pointing device. Because the screen acts as an input device as well as an output device, there is no separate hardware to become damaged or destroyed by dirt; this makes touch screens suitable for use in hostile environments.

14 **What is Eyegaze?**

Eyegaze systems allow you to control the computer by simply looking at it. Some systems require you to wear special glasses or a small head-mounted box. A low-power laser is shone into the eye and is reflected off the retina. The reflection changes as the angle of the eye alters, and by tracking the reflected beam the eyegaze system can determine the direction in which the eye is looking. Eyegaze is a very fast and accurate device, but the more accurate versions can be expensive.

15 **What is icon wars?**

Icon wars, occurs on window systems. The user clicks the mouse on a menu or icon, and nothing happens; for some reason the machine is busy or slow. So the user clicks again, tries something else and then, suddenly, all the buffered mouse clicks are interpreted and the screen becomes a blur of flashing windows and menus. This time, it is not so much that the response is too slow - it is fast enough when it happens - but that the response is variable. The delays due to swapping programs in and out of main memory typically cause these problems.

16 **What are the limitations on interactive performance?**

1.Computational bound, 2.Storage channel bound, 3.Graphics bound, 4.Network capacity

17 **What are the stages in Norman's model of interaction?**

1. Establishing the goal.
2. Forming the intention.
3. Specifying the action sequence.
4. Executing the action.
5. Perceiving the system state.
6. Interpreting the system state.
7. Evaluating the system state with respect to the goals and intentions.

18 **State Ergonomics. APRIL/MAY 2017**

Ergonomics (or human factors) is traditionally the study of the physical characteristics of the interaction: how the controls are designed, the physical environment in which the interaction takes place, and the layout and physical qualities of the screen. A primary focus is on user performance and how the interface enhances or detracts from this. In seeking to evaluate these aspects of the interaction, ergonomics will certainly also touch upon human psychology and system constraints.

19 **What are the common interface styles?**

Common interface styles includes,

1. command line interface
2. menus
3. natural language
4. question/answer and query dialog
5. form-fills and spreadsheets
6. WIMP
7. point and click
8. three-dimensional interfaces.

20 **Write notes on WIMP interface.**

WIMP stands for windows, icons, menus and pointers (sometimes windows, icons, mice and pull-down menus), and is the default interface style for the majority of interactive computer systems in use today, especially in the PC and desktop workstation arena. Examples of WIMP interfaces include Microsoft Windows for IBM PC compatibles, MacOS for Apple Macintosh compatibles and various X Windows-based systems for UNIX.

PART-B

- 1 Explain the concept of (i) Input-output channel (ii) The Human Memory (iii) Computer Memory
- 2 Write in detail the concept of human thinking and the way reasoning and problem solving.
- 3 Explain about devices used for positioning, pointing and drawing in detail.
- 4 Write short notes on Display devices.
i)Bitmap displays ii)Cathode Ray Tube iii)Liquid crystal Display iv)Digital paper
- 5 Explain in detail about physical controls, sensors and special devices with examples.
- 6 State and explain Gestalt theory and problem space theory.
- 7 Write short notes on
(i)Psychology and design of interactive systems
(ii)Text entry devices
(iii)Models of interaction
- 8 Explain in detail about Ergonomics.
- 9 Write in detail about Elements of the WIMP interface. **APRIL/MAY 2018**
- 10 Explain the concept of paradigms for interaction in detail.
- 11 Write down effects of finite processor. **APRIL/MAY 2018**
- 12 Write the factors that can limit the speed of interactive systems. **APRIL/MAY 2017,2018**
- 13 Explain the model of the structure of human memory with diagrammatic illustrations. **APRIL/MAY 2017.**
- 14 List and explain the stages of Norman's model of interaction. **APRIL/MAY 2017**
- 15 Outline the common interface styles used in interactive systems. **APRIL/MAY 2017**

UNIT-II DESIGN & SOFTWARE PROCESS

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

PART-A

1 What is Design?

Design is defined as achieving Goals within constraints and encompasses work tasks data design, architectural design, interface design and component-level design and create a design model or design specification.

2 What are the steps for Interaction Design process?

- Requirements
- Analysis and Design
- Iteration and prototyping
- Implementation and Deployment.

3 What are the classifications of evaluation techniques?

Cognitive walkthrough, Heuristic evaluation, Review based, Model based

4 What are the advantages and disadvantages of Prototyping Model?

Advantages:

- It produces the products quickly and thus saves the time and solves the waiting problem in waterfall model.
- It minimizes the cost and product failure.
- It is possible for the developers and client to check the function of preliminary implementations of system models before committing to a final system.
- It obtains feedback from clients and changes in system concept.

Disadvantages:

- It ignores quality, reliability, maintainability and safety requirements. Customer satisfaction is not achieved.

5 What are the Levels of Interaction?

Widgets, Screen design, Navigation design, Other apps and operating system

6 What are the two things you need in order for prototyping methods to work?

1. To understand what is wrong and how to improve.
2. A good start point.

7 What are the activities in the waterfall model of the software life cycle?

1. Requirements specification,
2. Design,
3. Construction,
4. Integration and Testing
5. Installation and Maintenance.

8 What are the Emphasis for usability engineering

The emphasis for usability engineering is in knowing exactly what criteria will be used to judge a product for its usability. The ultimate test of a product's usability is based on measurements of users' experience with it. Therefore, since a user's direct experience with an interactive system is at the physical interface, focus on the actual user interface is understandable.

9 **What are the Criteria by which measuring method can be determined?**

1. Time to complete a task 2. Per cent of task completed 3. Per cent of task completed per unit time 4. Ratio of successes to failures 5. Time spent in errors 6. Per cent or number of errors 7. Per cent or number of competitors better than it

10 **What are the possible ways to set measurement levels in a usability specification?**

1. Existing system or previous version
2. competitive systems
3. carrying out the task without use of a computer system
4. an absolute scale
5. your own prototype
6. user's own earlier performance
7. each component of a system separately
8. a successive split of the difference between best and worst values observed in user tests

11 **What are the three main goals of Evaluation?**

1. To assess the extent and accessibility of the system's functionality.
2. To assess users' experience of the interaction.
3. To identify any specific problems with the system.

12 **Define Design rationale.**

Design rationale is the information that explains why a computer system is the way it is, including its structural or architectural description and its functional or behavioral description.

13 **What is the beneficial to have access to the design rationale?**

1. design rationale provides a communication mechanism among the members of a design team so that during later stages of design and/or maintenance it is possible to understand what critical decisions were made, what alternatives were investigated .
2. Accumulated knowledge in the form of design rationales for a set of products can be reused to transfer what has worked in one situation to another situation which has similar needs.

14 **What is Design space Analysis?**

The design space is initially structured by a set of questions representing the major issues of the design. Since design space analysis is structure oriented, it is not so important that the questions recorded are the actual questions asked during design meetings.

15 **What is key to an effective design space analysis?**

The key to an effective design space analysis using the QOC(Questions,Options and Criteria) notation is deciding the right questions to use to structure the space and the correct criteria to judge the options.

16 What are the principles to support Usability?APRIL/MAY 2018

Learnability – the ease with which new users can begin effective interaction and achieve maximal performance

Flexibility – the multiplicity of ways in which the user and system exchange information.

Robustness – the level of support provided to the user in determining successful achievement and assessment of goals.

17 Define Usability and Effectiveness.

Usability- The effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments.

Effectiveness -The accuracy and completeness with which specified users can achieve specified goals in particular environments.

18 Define Standards.

Standards for interactive system design are usually set by national or international bodies to ensure compliance with a set of design rules by a large community. Standards can apply specifically to either the hardware or the software used to build the interactive system.

19 Define Efficiency and Satisfaction.

Efficiency -The resources expended in relation to the accuracy and completeness of goals achieved.

Satisfaction- The comfort and acceptability of the work system to its users and other people affected by its use

20 Define HCI Patterns.

A pattern is an invariant solution to a recurrent problem within a specific context. Patterns address the problems that designers face by providing a ‘solution statement’. Patterns are an approach to capturing and reusing this knowledge – of abstracting the essential details of successful design so that these can be applied again and again in new situations.

21 Define Universal Design principles.APRIL/MAY 2017

It is the process of designing products so that they can be used by as many people as possible in as many situations as possible.

PART-B

1. Explain in detail about process of Design and golden rule of Design.**APRIL/MAY 2018**
2. Explain in detail about Scenarios and usage of Scenarios.
3. Explain in detail about interaction design process.**APRIL/MAY 2017, 2018**
4. Explain in detail about Waterfall model of Software development Life cycle.**APRIL/MAY 2018**
5. Explain in detail about Prototyping Model.
6. Explain in detail about the usability engineering and principles to support Usability
7. Explain in detail about the Standards ,guidelines and golden rules for Interactive system design
8. Explain in detail about the Universal Design principles
9. Explain in detail about Evaluation Techniques.**APRIL/MAY 2017**
10. Explain in detail about Design rationale.
11. Narrate the shneiderman’s eight golden rule of interface design.**APRIL/MAY 2017**

UNIT -III MODELS AND THEORIES

Cognitive models -Socio-Organizational issues and stake holder requirements -Communication and collaboration models-Hypertext, Multimedia and WWW.

PART -A

1. **What is a Cognitive model?**

A Cognitive model is the designer's intended mental model for the user of the system: a set of ideas about how it is organized and operates.

2. **What is a models and theories?**

"analyze and design user interfaces and new user-interface technologies", "created software tools and development environment to facilitate the construction of graphical user interfaces", "pioneered the user of voice and video in user interfaces, hypertext links, interactive tutorials and context-sensitive help systems."

3. **Define Cognition psychology.**

Cognitive psychology is the study of mental processes such as "attention, language use, memory, perception, problem solving, creativity, and thinking

4. **Define user modeling?**

User modeling is the subdivision of human-computer interaction which describes the process of building up and modifying a conceptual understanding of the user. The main goal of user modeling is customization and adaptation of systems to the user's specific needs. The system needs to "say the 'right' thing at the 'right' time in the 'right' way".

5. **What do we do when there are several ways of solving a problem, or if the solutions to two sub goals interact?**

Users will often have more than one way to achieve a goal and there must be some way of representing how they select between competing solutions.

6. **What are issues for goal hierarchies**

1. Granularity,
2. Routine learned behavior, not problem solving,
3. Conflict,
4. Error

7. **What is GOMS. Mention four elements of GOMS. APRIL/MAY 2018**

GOMS is a specialized human information processor model for human-computer interaction observation that describes a user's cognitive structure on four components. a set of **Goals**, a set of **Operators**, a set of **Methods** for achieving the goals, and a set of **Selections** rules for choosing among competing methods for goals.

8. **Define Goals and Operators.**

Goals are symbolic structures that define a state of affairs to be achieved and determinate a set of possible methods by which it may be accomplished

Operators are elementary perceptual, motor or cognitive acts, whose execution is necessary to change any aspect of the user's mental state or to affect the task environment

9. **Define Methods and Selections.**

Methods describe a procedure for accomplishing a goal

Control Structure: Selection Rules are needed when a goal is attempted, there may be more than one method available to the user to accomplish it.

10. **Give an example for GOMS**

GOAL: CLOSE-WINDOW

. [select GOAL: USE-MENU-METHOD

. MOVE-MOUSE-TO-FILE-MENU

. PULL-DOWN-FILE-MENU

. CLICK-OVER-CLOSE-OPTION

GOAL: USE GOAL: USE-CTRL-W-METHOD

. PRESS-CONTROL-W-KEYS]

For a particular user:

Rule 1: Select USE-MENU-METHOD unless another rule applies

Rule 2: If the application is GAME, select CTRL-W-METHOD

11. **Describe Cognitive complexity theory**

Cognitive complexity theory, begins with the basic premises of goal decomposition from GOMS and enriches the model to provide more predictive power. CCT has two parallel descriptions: one of the user's goals and the other of the computer system (called the device in CCT).

12. **Describe various problem with CCT.**

There are various problems with CCT. As with many 'rich' description methods, the size of description for even a part of an interface can be enormous. Furthermore, there may be several ways of representing the same user behavior and interface behavior, yielding different measures of dissonance.

13. **How to Representative of the linguistic approach?**

Representative of the linguistic approach is Reisner's use of Backus-Naur Form (BNF) rules to describe the dialog grammar. This views the dialog at a purely syntactic level, ignoring the semantics of the language. BNF has been used widely to specify the syntax of computer programming languages, and many system dialogs can be described easily using BNF rules.

14. **What is Task Action Grammar?**

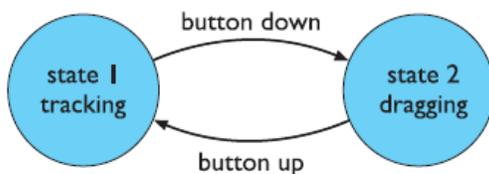
Measures based upon BNF have been criticized as not 'cognitive' enough. They ignore the advantages of consistency both in the language's structure and in its use of command names and letters. Task-action grammar (TAG) [284] attempts to deal with some of these problems by including elements such as parametrized grammar rules to emphasize consistency and encoding the user's world knowledge

15. **Define Keystroke Level Model (KLM).**

KLM (Keystroke-Level Model) uses this understanding as a basis for detailed predictions about user performance. It is aimed at unit tasks within interaction – the execution of simple command sequences, typically taking no more than 20 seconds.

16. **Define three-state model.**

The three-state model, which captures some of these crucial distinctions. He begins by looking at a mouse. If you move it with no buttons pushed, it normally moves the mouse cursor about. This tracking behavior is termed state 1. Depressing a button over an icon and then moving the mouse will often result in an object being dragged about. This he calls state 2.



17. **Define term computer-supported cooperative work' (CSCW).**

The term 'computer-supported cooperative work' (CSCW) seems to assume that groups will be acting in a cooperative manner. This is obviously true to some extent; even opposing football teams cooperate to the extent that they keep (largely) within the rules of the game, but their cooperation only goes so far. People in organizations and groups have conflicting goals, and systems that ignore this are likely to fail spectacularly.

18. **What is use of storekeeper ?**

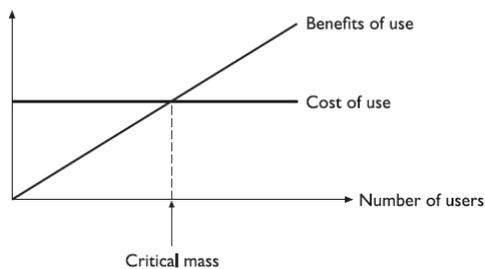
The storekeeper always used to understate stock levels slightly in order to keep an emergency supply, or sometimes inflate the quoted levels when a delivery was due from a reliable supplier. Also, requests for stock information allowed the storekeeper to keep track of future demands and hence plan future orders.

19. **What is Free rider problem ?**

A few free riders in a conference system are often not a problem, as the danger is more likely from too much activity. In addition, in electronic conferences the patterns of activity and silence may reflect other factors such as expertise. However, it is easy for the number of free riders gradually to increase and the system slide into disuse.

20. **What is 'Critical Mass' ?**

Critical mass is the point at which a growing company becomes self-sustaining, and no longer needs additional investment to remain economically viable.



21. **Who are the stakeholders?**

Understanding stakeholders is key to many of the approaches to requirements capture, since in an organizational setting it is not simply the end-user who is affected by the introduction of new technology

22. **Define CUSTOM methodology. APRIL/MAY 2018**

CUSTOM is a socio-technical methodology designed to be practical to use in small organizations. It is based on the User Skills and Task Match (USTM) approach, developed to allow design teams to understand and fully document user requirements . CUSTOM focusses on establishing stakeholder requirements: all stakeholders are considered, not just the end-users.

23. **What are the CATWOE approach?**

Primary stakeholders are people who actually use the system – the end-users.

Secondary stakeholders are people who do not directly use the system, but receive output from it or provide input to it (for example, someone who receives a report produced by the system).

Tertiary stakeholders are people who do not fall into either of the first two categories but who are directly affected by the success or failure of the system (for example, a director whose profits increase or decrease depending on the success of the system).

Facilitating stakeholders are people who are involved with the design, development and maintenance of the system.

24. **Define Open System Task Analysis (OSTA)**

OSTA is an alternative socio-technical approach, which attempts to describe what happens when a technical system is introduced into an organizational work environment. Like CUSTOM, OSTA specifies both social and technical aspects of the system. However, whereas in CUSTOM these aspects are framed in terms of stakeholder perspectives, in OSTA they are captured through a focus on tasks.

25. **Define Soft systems methodology (SSM).**

Soft systems methodology (SSM) arises from the same tradition but takes a view of the organization as a system of which technology and people are components. There is no assumption of a particular solution: the emphasis is rather on understanding the situation fully.

26. **Define ETHICS methodology.**

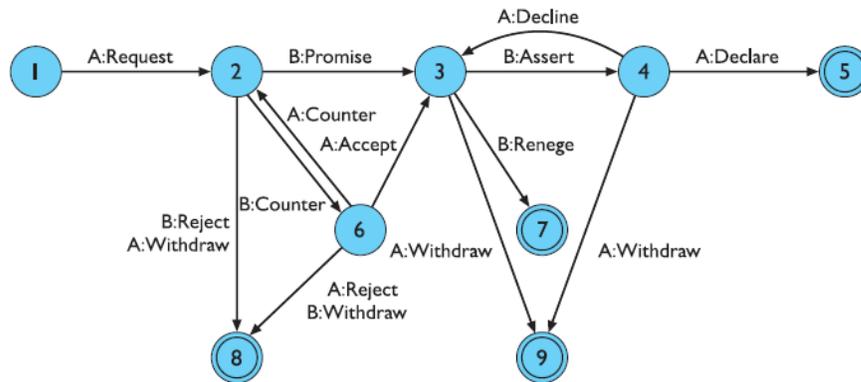
Effective Technical and Human Implementation of Computer-based Systems (ETHICS) ETHICS considers the process of system development as one of managing change: conflicts will occur and must be negotiated to ensure acceptance and satisfaction with the system. If any party is excluded from the decision-making process then their knowledge and contribution is not utilized and they are more likely to be dissatisfied. However, participation is not always complete.

27. **What is FACE-TO-FACE communication?**

Face-to-face contact is the most primitive form of communication – primitive, that is, in terms of technology. If, on the other hand, we consider the style of communication, the interplay between different channels and productivity, we instead find that face-to-face is the most sophisticated communication mechanism available. The first thing to note is that face-to-face communication involves not just speech and hearing, but also the subtle use of body language and eyegaze.

28. **What is Speech act theory?**

A particular form of conversational analysis, speech act theory, has been both influential and controversial in CSCW. Not only is it an analytic technique, but it has been used as the guiding force behind the design of a commercial system, Coordinator.



29. **What is the use Text-based communication?**

Text-based communication is familiar to most people, in that they will have written and received letters. The text-based communication in groupware systems is acting as a speech substitute, and, thus, there are some problems adapting between the two media.

30. **What are four types of textual communication ? APRIL/MAY 2017**

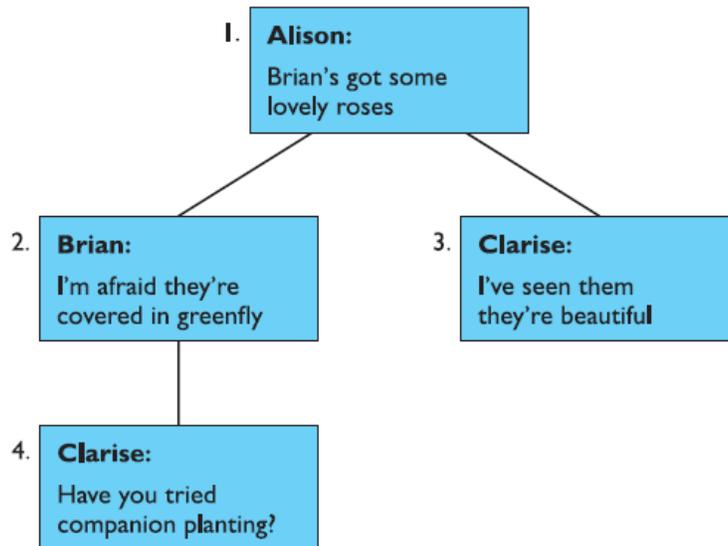
discrete – directed message as in email. There is no explicit connection between different messages, except in so far as the text of the message refers to a previous one.

linear – participants' messages are added in (usually temporal) order to the end of a single transcript.

non-linear – when messages are linked to one another in a hypertext fashion.

spatial– where messages are arranged on a two-dimensional surface.

31. **Draw Hypertext conversation structure.**



32. **What is use of distributed cognition**

A school of thinking has recently developed which regards thinking as happening not just within the head, but in the external relationships with things in the world and with other people. This viewpoint is called distributed cognition

33. **What is hypertext, multimedia and the world-wide web.**

- Hypertext allows documents to be linked in a non-linear fashion.
- Multimedia incorporates different media: sound, images, video.
- The world wide web is a global hypermedia system.

34. **What is the advantage of animation?**

1. Communication Skills
2. Building Bridges
3. Self-expression
4. Technical Skills
5. Presentation Skills

35. **Define web technology and issues.**

The web consists of a set of protocols built on top of the internet that, in theory, allow multimedia documents to be created and read from any connected computer in the world. The web supports hypertext, graphics, sound and movies, and, to structure and describe the information, uses a language called HTML (hypertext markup language) or in some cases, XML (extensible markup language).

36. Define web servers and clients

A Web server is a program that uses HTTP (Hypertext Transfer Protocol) to serve the files that form Web pages to users, in response to their requests, which are forwarded by their computers' HTTP clients. Dedicated computers and appliances may be referred to as Web servers as well.

37. What is the difference between static and dynamic web pages?

In simplest terms, static Web pages are those with content that cannot change without a developer editing its source code, while dynamic Web pages can display different content from the same source code. When it comes to using static or dynamic pages for parts of your company's website, having the most advanced code on each of your pages is not important.

PART B

1. Create a GOMS description of the task of photocopying an article from a journal. Discuss the Issue of closure in terms of your GOMS description
2. Explain in details of three-state model.
3. Explain in details of organizational issues.**APRIL/MAY 2018**
4. Who is stackholder? Outline the types of stackholder and appraise the stackholders for an airline booking system. **APRIL/MAY 2017**
5. Explain in details custom methodology and open system task analysis (OSTA).
6. Explain in details soft systems methodology.
7. Explain problem space model and interacting cognitive subsystem in detail.**APRIL/MAY 2018**
8. Explain in details effective technical and human implementation of computer-based systems (ethics).
9. Explain in details face-to-face communication.
10. Explain the stages involved in CUSTOM methodology analysis.**APRIL/MAY 2017**
11. What is cognitive model? Classify cognitive models and discuss the same.**APRIL/MAY 2017**

UNIT IV-Mobile HCI

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

PART- A

1 List out the layers of the mobile ecosystem.

- 1.Services,
- 2.Applications
- 3.Application Frameworks
- 4.Operating Systems
- 5.Platforms
- 6.Devices
- 7.Aggregators
- 8.Networks
- 9.Operators.

2 What are the services?

Services include tasks such as accessing the Internet, sending a text message, or being able to get a location—basically, anything the user is trying to do.

3 **What do you mean by Operators?**

The base layer in the mobile ecosystem is the *operator*. Operators go by many names, depending on what part of the world you happen to be in or who you are talking to. Operators can be referred to as Mobile Network Operators (MNOs); mobile service providers, wireless carriers, or simply carriers; mobile phone operators; or cellular companies.

4 **What is the use of application layer?**

Application frameworks are used to create applications, such as a game, a web browser, a camera, or media player. Although the frameworks are well standardized, the devices are not. The largest challenge of deploying applications is knowing the specific device attributes and capabilities.

5 **What is the need of Application Framework layer?**

The first layer that you have any control over is the choice of application framework. Application frameworks often run on top of operating systems, sharing core services such as communications, messaging, graphics, location, security, authentication, and many others.

6 **What is Mobile platform?**

A mobile platform's primary duty is to provide access to the devices. To run software and services on each of these devices, you need a *platform*, or a core programming language in which all of your software is written.

7 **What are all the types of Mobile Platforms? APRIL/MAY 2017**

Licensed:- Licensed platforms are sold to device makers for nonexclusive distribution on devices. Eg. Java Micro Edition (Java ME), Binary Runtime Environment for Wireless (BREW), Windows Mobile, LiMo

Proprietary:- Proprietary platforms are designed and developed by device makers for use on their devices. Eg. Palm, BlackBerry, iPhone

Open Source:- Open source platforms are mobile platforms that are freely available for users to download, alter, and edit. Open source mobile platforms are newer and slightly controversial, but they are increasingly gaining traction with device makers and developers. Android is one of these platforms.

8 **What is the use of Mobile Application medium type?**

The *mobile medium type* is the type of application framework or mobile technology that presents content or information to the user. It is a technical approach regarding which type of medium to use; this decision is determined by the impact it will have on the user experience. The technical capabilities and capacity of the publisher also factor into which approach to take.

9 **What is Web Widget?**

A mobile web widget is a standalone chunk of HTML-based code that is executed by the end user in a particular way.

10 **Write about pros and cons of the Mobile web applications.**

Pros:-

- They are easy to create, using basic HTML, CSS, and JavaScript knowledge.
- They are simple to deploy across multiple handsets.
- They offer a better user experience and a rich design, tapping into device features and offline use.
- Content is accessible on any mobile web browser.

Cons:-

- The optimal experience might not be available on all handsets.
- They can be challenging (but not impossible) to support across multiple devices.

- They don't always support native application features, like offline mode, location lookup, filesystem access, camera, and so on.

11 **Give short notes on Immersive Full Screen Applications.**

The immersive full-screen applications is like a game, a media player, or possibly even a single-screen utility. These applications are meant to consume the user's focus, often doing so by filling the entire screen, and leaving no trace of the device user interface to distract the user. Again, the majority of mobile engagement occurs when the user has idle periods of time; the immersive context is typical in most entertainment applications, one of the most popular mobile content areas.

12 **What is the use of Productivity Application Context?**

The productivity application context is used for content and services that are heavily task-based and meant to increase the users' sense of efficiency. With these types of applications, we can assume that the users are more committed to accomplishing a particular goal, like managing content such as messages, contacts, or media, but we should still assume that they are doing so during idle periods.

13 **List down the disciplines of mobile Information architecture.**

- *Information architecture*-The organization of data within an informational space. In other words, how the user will get to information or perform tasks within a website or application.
- *Interaction design*-The design of how the user can participate with the information present, either in a direct or indirect way, meaning how the user will interact with the website of application to create a more meaningful experience and accomplish her goals.
- *Information design*-The visual layout of information or how the user will assess meaning and direction given the information presented to him.
- *Navigation design*-The words used to describe information spaces; the labels or triggers used to tell the users what something is and to establish the expectation of what they will find.
- *Interface design*-The design of the visual paradigms used to create action or understanding.

14 **What is the use of Clickstreams?**

Clickstream is a term used for showing the behavior on websites, displaying the order in which users travel through a site's information architecture, usually based on data gathered from server logs. Clickstreams are usually historical, used to see the flaws in your information architecture, typically using heat-mapping or simple percentages to show where your users are going.

15 **Why Wireframes required?**

Wireframes are a way to lay out information on the page, also referred to as information design. Site maps show how our content is organized in our informational space; wireframes show how the user will directly interact with it. they also serve to separate layout from visual design, defining how the user will interact with the experience.

16 **Write about different types of Mobile Prototyping.**

Paper prototypes-The most basic level we have is paper prototyping: taking our printed-out wireframes or even drawings of our interface, and putting them in front of people.

Context prototype-Take a higher-end device that enables you to load full-screen images on it. Take your wireframes or sketches and load them onto the device, sized to fill the device screen.

HTML prototypes-This is a prototype that you can actually load onto a device and produce the nearest experience to the final product, but with static dummy content and data. It takes a little extra time, but it is worth the effort.

17 **Define Subpixels.**

A subpixel is the division of each pixel into a red, green, and blue (or RGB) unit at a microscopic level, enabling a greater level of antialiasing for each font character or glyph. The addition of these RGB subpixels enables the eye to see greater variations of gray, creating sharper antialiasing and crisp text.

18 **What is Pixel Density?**

The pixel density is determined by dividing the width of the display area in pixels by the width of the display area in inches. As this applies to mobile devices, the higher the density of pixels, the sharper the screen appears to the naked eye. This guideline especially applies to type, meaning that as text is antialiased on a screen with a high density of tiny pixels, the glyph appears sharper to the eye.

19 **What are all the ways of defining a Color Palette?**

Sequential:- In this case, there are primary, secondary, and tertiary colors. Often the primary color is reserved as the “brand” color or the color that most closely resembles the brand’s meaning. The secondary and tertiary colors are often complementary colors.

Adaptive:- An adaptive palette is one in which you leverage the most common colors present in a supporting graphic or image.

Inspired:- This is a design that is created from the great pieces of design you might see online or offline, in which a picture of the design might inspire you. This could be anything from an old poster in an alley, a business card, or some packaging. Like with the adaptive palette, you actually extract the colors from the source image, though you should never ever use the source material in a design.

20 **List out the rules to be followed for Readability in mobile design?**

- Use a high-contrast typeface
- Use the right typeface
- Provide decent leading (rhymes with “heading”) or line spacing
- Leave space on the right and left of each line; don’t crowd the screen
- Generously utilize headings
- Use short paragraphs

21 **What is an Iconography?**

The most common form of graphics used in mobile design is icons. Iconography is useful to communicate ideas and actions to users in a constrained visual space. The challenge is making sure that the meaning of the icon is clear to the user.

22 **List out some Design tool and interface toolkits for different mobile frameworks? APRIL/MAY**

Mobile framework	Design tool	Interface toolkits
Java ME	Photoshop, NetBeans	JavaFX, Capuchin
BREW	Photoshop, Flash	BREW UI Toolkit, uiOne, Flash
iPhone	Photoshop, Interface Builder	iPhone SDK
Android	Photoshop, XML-based themes	Android SDK
Palm webOS	Photoshop, HTML, CSS, and JavaScript	Mojo SDK
Mobile web	Photoshop, HTML, CSS, and JavaScript	W3C Mobile Web Best Practices
Mobile widgets	widgets Photoshop, HTML, CSS, and JavaScript	Opera Widget SDK, Nokia Web Runtime
Mobile web apps	Photoshop, HTML, CSS, and JavaScript	iUI, jQTouch, W3C Mobile Web App Best Practices

PART B

1. Write detailed notes on Platforms in Mobile Ecosystem?
2. Write in detail about Application Frameworks in Mobile Ecosystem?
3. Write short notes on SMS and Mobile Websites with their pros and cons?
4. Discuss in detail about Mobile Web Widgets and Native Applications with their pros and cons?
5. Explain Mobile web applications and Games in mobile application medium types?
6. Appraise the types of mobile application with example. **APRIL/MAY 2017**
7. List and explain the elements of mobile design. **APRIL/MAY 2017**
8. Discuss about Mobile Information Architecture. **APRIL/MAY 2018**
9. Explain the concepts of Color, Typography and Graphics in mobile design elements.
10. Discuss about
 - a. Mobile Design Tools
 - b. Designing for the Right Device
 - c. Designing for Different Screen Sizes
11. Discuss the various elements of mobile design with step by step method, explain how to design an registration page for movie ticket booking. **APRIL/MAY 2018**

UNIT-V WEB INTERFACE DESIGN

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

PART-A

1. List any five events available for cueing the user during a drag and drop interaction?

- Page Load
- Mouse Hover
- Mouse Down
- Drag Initiated
- Drag Leaves Original Location.

2. Define Grid.

The grid is a handy tool for planning out interesting moments during a drag and drop interaction. It serves as a checklist to make sure there are no “holes” in the interaction.

3. Explain Placeholder targeting and Midpoint boundary.

Placeholder targeting - Most explicit way to preview the effect.

Midpoint boundary - Requires the least drag effort to move modules around.

4. Explain Full-size module dragging and Ghost rendering.

Full-size module dragging - Coupled with placeholder targeting and midpoint boundary detection, it means drag distances to complete a move are shorter.

Ghost rendering - Emphasizes the page rather than the dragged object. Keeps the preview clear.

5. What do you mean by drag lens?

A drag lens provides a view into a different part of the list that can serve as a shortcut target. It could be a fixed area that is always visible, or it could be a miniature view of the list that provides more rows for targeting. The lens will be made visible only during dragging. Example: Dragging the insertion bar while editing text on the iPhone.

6. When a drop will be invalid in Yahoo! Mail?

- The dragged object's icon becomes a red invalid sign.
- If over an invalid folder, the folder is highlighted as well.

7. When a drop will be valid in Yahoo! Mail?

- The dragged object's icon changes to a green checkmark.
- The drop target highlights.

8. Write the good rule of thumb on drag initiation from the Apple Human Interface Guidelines.

Your application should provide drag feedback as soon as the user drags an item at least three pixels. If a user holds the mouse button down on an object or selected text, it should become draggable immediately and stay draggable as long as the mouse remains down.

9. What do you mean by drag and drop collection? APRIL/MAY 2018

A variation on dragging objects is collecting objects for purchase, bookmarking, or saving into a temporary area. This type of interaction is called Drag and Drop Collection.

10. List the four broad areas where Drag and Drop may be employed.

Module, List, Object, Action

11. What do you mean by Object Selection? APRIL/MAY 2018

On the desktop, the most common approach is to initiate a selection by directly clicking on the object itself. We call this selection pattern Object Selection. Object Selection is used for initiating a drag drop.

12. What is meant by Toggle Selection?

The most common form of selection on the Web is Toggle Selection. Checkboxes and toggle buttons are the familiar interface for selecting elements on most web pages. Example: Yahoo! Mail Classic. Toggle Selection is used for selecting bookmarks for editing, deleting, etc.

13. Define Collected Selection.

Collected Selection is a pattern for keeping track of selection as it spans multiple pages. Gmail does provide a way to select all items across different pages. When selecting all items on a individual page (with the "All" link), a prompt appears inviting the user to "Select all 2785 conversations in Spam". Clicking that will select all items across all pages. The "Delete Forever" action will operate on all 2785 conversations, not just the 25 selected on the page.

14. Explain Hybrid Collection.

Hybrid Selection brings with it the best of both worlds. You can use the checkbox selection model as well as normal row selection. You get the benefit of explicit selection and simplified multiple selection that Toggle Selection brings. And you get the benefit of interacting with the message itself and direct object highlighting.

15. Define Fitts's Law.

Fitts's Law is an ergonomic principle that ties the size of a target and its contextual proximity to ease of use. Bruce Tognazzini restates it simply as:

The time to acquire a target is a function of the distance to and size of the target.

In other words, if a tool is close at hand and large enough to target, then we can improve the user's interaction.

16. What do you mean by Contextual Tools?

Contextual Tools are the Web's version of the desktop's right-click menus. Instead of having to right-click to reveal a menu, we can reveal tools in context with the content.

17. What are the issues with showing contextual tools in an overlay?

1. Providing an overlay feels heavier. An overlay creates a slight contextual switch for the user's attention.

2. The overlay will usually cover other information – information that often provides context for the tools being offered.

3. Most implementations shift the content slightly between the normal view and the overlay view, causing the users to take a moment to adjust to the change.

4. The overlay may get in the way of navigation. Because an overlay hides at least part of the next item, it becomes harder to move the mouse through the content without stepping into a “landmine.”

18. Define Mystery Meat and Soft Mode.

Mystery Meat - It is a common anti-pattern that occurs when you have to hover over an item to understand how to use it.

Soft Mode - If a mode is *soft* it is usually acceptable. By “soft” we mean the user is not trapped in the mode.

19. Define Muttons.

Muttons (menu + button = mutton) are useful when there are multiple actions and we want one of the actions to be the default. Yahoo! Mail uses a mutton for its “Reply” button. It is a variation on Multi-Level Tools. Muttons are used to:

- Provide a default button action (“Reply to Sender”)
- Provide a clue that there are additional actions.
- Provide additional actions in the drop-down.

20. Define overlays and inlays.

Overlays - Instead of going to a new page, a mini-page can be displayed in a lightweight layer over the page.

Inlays - Instead of going to a new page, information or actions can be inlaid within the page.

21. List the three specific types of overlays. APRIL/MAY 2017

- Dialog Overlays
- Detail Overlays
- Input Overlays

22. When should an overlay be used?

- Use an overlay when there may be more than one place a dialog can be activated from
- Use an overlay to interrupt the process.
- Use an overlay if there is a multi-step process.

23. When should an inlay be used?

- Use an inlay when you are trying to avoid covering information on the page needed in the dialog.
- Use an inlay for contextual information or details about one of many items (as in a list): a typical example is expanding list items to show detail.

24. What are the Patterns that support virtual pages?

- Virtual Scrolling
- Inline Paging
- Scrolled Paging
- Panning
- Zoomable User Interface

25. Compare paging and scrolling.

- When the data feels “more owned” by the user—in other words, the data is not

transient but something users want to interact with in various ways. If the users want to sort the data, filter it, and so on, consider Virtual Scrolling (as in Yahoo! Mail).

- When the data is more transient (as in search results) and will get less and less relevant the further users go in the data, Inline Paging works well (as with the iPhone).
- For transient data, if you don't care about jumping around in the data to specific sections, consider using Virtual Scrolling (as in Live Image Search).
- If you are concerned about scalability and performance, paging is usually the best choice. Originally Microsoft's Live Web Search also provided a scrollbar.
- If the content is really continuous, scrolling is more natural than paging.
- If you get your revenue by page impressions, scrolling may not be an option for your business model.
- If paging causes actions for the content to become cumbersome, move to a scrolling model.

26. List out the process flow patterns.

- Interactive Single-Page Process
- Inline Assistant Process
- Configurator Process
- Overlay Process
- Static Single-Page Process

PART-B

1. Summarize the principles for designing rich web interface. **APRIL/MAY 2017**
2. What is the purpose of drag and drop? Briefly explain drag and drop module.
3. Explain the various types of selection patterns with examples.
4. Briefly explain the various contextual tools with examples. **APRIL/MAY 2018**
5. Explain in detail about dialog overlays and inlays.
6. Briefly explain the following:
 - (i) Detail Overlays
 - (ii) Input Overlays
7. Explain in detail about list and detail inlay.
8. Briefly explain Virtual Scrolling, Inline Paging and Scrolled Paging.
9. Explain the following:
 - (i) Virtual Panning
 - (ii) Zoomable User Interface
10. Briefly explain Configurator Process, Overlay Process and Static Single-Page Process.
11. Explain the following:
 - (i) Interactive Single-Page Process
 - (ii) Inline Assistant Process
12. Explain the following:
 - (i) Virtual Panning
 - (ii) Zoomable User Interface
13. Design a web interface for a "Library Management System". State the functional requirements you are considering. **APRIL/MAY 2017**
14. Write in brief the process flow of web interface design. **APRIL/MAY 2018**

MG 6088 - Software Project Management

UNIT-I

PROJECT EVALUATION AND PROJECT PLANNING

1. What is a project?

The dictionary definition puts a clear emphasis on the project being a planned activity. A project is a unique venture with a beginning and an end, conducted by people to meet established goals within parameters of cost, schedule and quality.

2. What are the characteristics of a project? (NOV 2015 / APRIL 2016)

- Non-routine tasks are involved
- Planning is required
- Specific objects are to be met or a specified product is to be correct
- The project has a predetermined timespan.

3. What are the differences between software projects and other types of projects? (APRIL 2016)

- Invisibility-Software can't be represented with geometric models
- Complexity-The proposed model is based on the widely known and accepted
- Confirmity-The controlling document for software
- Flexibility-project management performance

4. Define Contract Management. (May/June 2013/Apr 2014).

Contract management or contract administration is the management of contracts made with customers, vendors, partners, or employees. Contract management includes negotiating the terms and conditions in contracts and ensuring compliance with the terms and conditions, as well as documenting and agreeing on any changes that may arise during its implementation or execution.

5. What are the Technical Project Planning Methodologies

- Identify different approaches to planning technical projects: rolling wave
- Planning... stage gate process... critical chain project management
- Common construction project life cycle
- Common pharmaceutical project life cycle

6. What are the three successive processes that bring a new system? (Nov/Dec 2012)

- The feasibility study- Evaluate the cost of the software development against the Software Engineering
- Planning- outline the structure of the project.
- Project Execution- Product Implementation Product implementation activities.

7. Define Feasibility Study.

It is based on an outlined design of system requirements in terms of Input, Processes, Output, Fields, Programs, and Procedures. This can be quantified in terms of volumes of data, trends, frequency of updating, etc.

8. What is meant by planning?

Planning a process involves the determination of future course of action, that is, why an action, what action, how to take action, and when to take action. These why, what, how, and when are related with different aspects of planning process.

9. What are the phases in software development life cycle?

- Requirement analysis
- Architecture design
- Detailed design
- Code and test
- Integration
- Qualification testing.
- Installation.

10. Define Requirement Analysis.

This investigates what the potential users and their managers and employers require as features and qualities of the new system.

11. What is meant by qualification testing?

The system, including the software components, has to be tested carefully to ensure that all the requirements have been fulfilled.

12. What is the difference between Information systems and embedded systems?

Information systems:-

Information System includes databases that include useful "information". Information Systems is the discipline concerned with the development, use, application and influence of information systems.

Embedded Systems:-

Embedded systems include small computers that make things work, such as the computer in your radio, television or the computer that controls your vehicle engine. An embedded system is a computer system that is part of a larger system.

Examples:

- Washing machine
- Car engine control

13. Differentiate Objectives Vs products.

Objectives are goals or aims which the management wishes the organization to achieve.

These are the endpoints or pole-start towards which all business activities like organizing, staffing, directing and controlling are directed.

A project might be to create a **product**, the details of which have been specified by the client.

The client has the responsibility for justifying the product.

14. What is management?

Management can be defined as all activities and tasks undertaken by one or more persons for the purpose of planning and controlling the activities of others in order to achieve objectives or complete an activity that could not be achieved by others acting independently.

15. What are the activities of management? (Apr 2014)

- Planning – Deciding what is to be done.
- Organizing – making arrangements.
- Staffing – selecting the right people for the job
- Directing – giving instructions.
- Monitoring – checking on progress
- Controlling – taking action to remedy hold-ups
- Innovating – coming up with new solutions.
- Representing – liaising with clients, users, developers, suppliers

16. What are the measures of effectiveness that are used to check the success of a project? (Dec 2016)

- Schedule
- Evaluate stakeholder and customer satisfaction
- Budget.
- Team satisfaction
- Customer satisfaction.
- Quality of work.

17. What is the responsibility of the project steering committee? (December 2016)

- Monitoring progress against the project management plan.
- Reviewing and verifying changes made to the Business Case.
- Reviewing and approving changes made to project resource plan, schedules, scope, goals, cost estimates, etc.
- Reviewing and approving the project development strategy.
- Reviewing and suggesting solutions for the issues critical to project success.
- Resolving conflicts between stakeholder groups

18. What is meant by management control?

The process of setting objectives for a system and then monitoring the system to see what is true performance. A change is proposed by anyone evaluating the software.

19. What are the steps involved in step wise planning?

- Identify project scope and objectives.
- Identify project infrastructure. 3. Analyze project characteristics.
- Identify project products and activities.
- Estimate effort for each activity.
- Identify activity risks.
- Allocate resources.
- Review/publicize plan. 9. Execute plan/ lower levels of planning.

20. How to identify project infrastructure?

- Establish relationship between project and strategic planning.
- Identify installation standards and procedures.
- Identify project team organization.

21. How to manage activity risks?

- Identify and quantify activity-based risks.
- Plan risk reduction and contingency measures where appropriate
- Adjust plans and estimates to take account of risks.

22. Define project stake holders. (APRIL 2015)

Stakeholders are the people involved in or affected by the project activities. Stakeholders are

Project leader

Senior management

Project team members

Project customer

Product user group

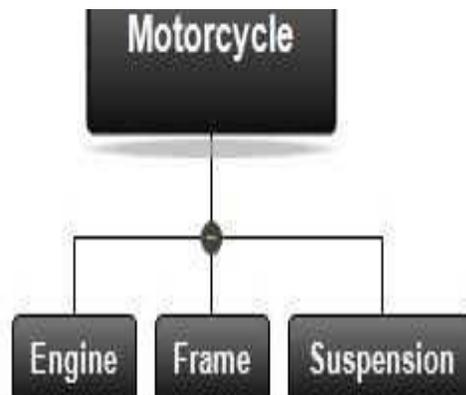
Project testers

23. Define process. (Nov/Dec 2011)

A software process provides the framework from which a comprehensive plan for software development can be established.

24. What is a product breakdown structure (PBS)? show the hierarchical diagram of sample PBS. (May/Jun 2012)

A product breakdown structure is an effective tool that details the physical components of a particular product, or system, under consideration. The formal PBS comes in the form of a hierarchy. It begins with the final product at the top of the hierarchy followed by the sub-categorized elements of the product. The product breakdown structure is similar to the work breakdown structure (WBS).



25. What are the steps in cost-benefit analysis?

- Identifying and estimating all of the costs and benefits of carrying out the project and operating the delivered application.
- Expressing these costs and benefits in common units.
- Project costs and benefits over the life of the program
- Compute net present values.

26. Define development costs.

Development costs include the salaries and other employment costs of the staff involved in the development project and all associated costs.

27. Define setup costs.

Setup costs include the costs of putting the system into place. These consist of mainly the costs of the new hardware but also including the costs of file conversion, recruitment and staff training.

28. Define operational costs.

It consists of the costs of operating the system once it has been installed.

29. What is meant by cost flow forecasting? (Apr 2014)

As important as estimating the overall costs and benefits of a project is the forecasting of the cash flow that will take place and their timing. A cash flow forecast will indicate when expenditure and income will take place.

30. What are the cost-benefit evaluation techniques?

- Net profit - *net profit* and discounted cash flow automatically
- Payback period - projects will provide a true return on investment while meeting an acceptable Return of Investment - successfully complete projects and receive a return on investment.
- Net present value - Successful Projects Fortunately for project managers
- Internal rate of return - delegation of general management authority to the Project Leader

31. Define Decision tree. (May/June 2013)

Decision tree provides tools for evaluating expected outcomes and choosing between alternate strategies.

Advantages

Assistance in upgrading, designing and developing a software.

32. What is IRR? How is it calculated? (Nov/Dec 2011) (May/June 2012)

The internal rate of return on an investment or project is the "annualized effective compounded return rate" or rate of return that makes the net present value (NPV as $NET * 1 / (1 + IRR)^{year}$) of all cash flows (both positive and negative)

33. What is the significance of a "project risk matrix"? Give an example (May/June 2012)

- Identify the risk and give priority.
- Could draw up a project risk matrix for each project to assess risks
Project risk matrix used to identify and rank the risk of the project.

34. What are different categories of project cost?

Set up cost

Development cost

Operational cost

35. What is software project Management? (NOV -2009)(JUNE -2014) The software project management is the art and science of planning and leading software projects. It is a sub discipline of project management in which software project are planned monitored and controlled.

PART B

1. Explain the difference between software projects and other projects in detail.
2. Explain activities covered by the software project management.(Apr2014/NOV 2014)
3. What is management? Explain the problems with software projects.(Nov/Dec2012)
4. Explain the step-wise project planning in detail.(NOV2015/APRIL 2016)
5. How to analyze the project characteristics?(may/Jun2012)
6. Explain the various SDLC activities as outlined by ISO12207 with a neat diagram.(May/Jun2012 / APRIL 2015)
7. Write in detail project management with strategic assessment.(Nov/Dec2011/APRIL2016)
8. Explain cost benefit evaluation techniques.(NOV 2014/Apr2014 / APRIL 2015/NOV 2015)
9. Explain Decision trees with examples.
10. Explain risk evaluation. (Nov 2014/April 2015/April 2016)

UNIT-II:PROJECT LIFE CYCLE AND EFFORT ESTIMATION

PART-A

1. What is Process?

A process is a collection of interrelated work tasks initiated in response to an event that achieves a specific result for the customer of the process.

2. What is Product Life Cycle?

A Process Model describes the sequence of phases for the entire lifetime of a product. Therefore it is sometimes also called Product Life Cycle. This covers everything from the initial commercial idea until the final de-installation or disassembling of the product after its use.

3. What are the phases in Product Life Cycle?

- concept phase
- implementation phase
- maintenance phase

4. What is Rapid Application Development?

RAD model is Rapid Application Development model. It is a type of **incremental model**.

The RAD model is, therefore, a sharp alternative to the typical waterfall development model, which often focuses largely on planning and sequential design practices.

5. What is Agile methods?

“Agile Development” is an umbrella term for several iterative and incremental software development **methodologies**. The most popular **agile methodologies** include Extreme Programming (XP), Scrum, Crystal, Dynamic Systems Development Method (DSDM), Lean Development, and Feature-Driven Development (FDD)

6. Define SCRUM.

- **Scrum** is an iterative and incremental framework for project management mainly deployed in agile software development

7. What are the benefits if SCRUM?

- Increase the quality of the deliverables
- Cope better with change (and expect the changes)
- Provide better estimates while spending less time creating them
- Be more in control of the project schedule and state

8. List the roles of SCRUM.

The three roles defined in Scrum are the Scrum Master, the Product Owner, and the Team

9. List out the SCRUM Meetings

Scrum has five meetings:

- Backlog Grooming (aka Backlog Refinement),
- Sprint Planning,
- Daily Scrum (aka 15-minute standup),
- the Sprint Review Meeting,
- The Sprint Retrospective Meeting.

10. Define Cost Estimation

A **cost estimate** is the approximation of the **cost** of a program, project, or operation. The **cost estimate** is the product of the **cost estimating** process. The **cost estimate** has a single total value and may have identifiable component values.

11. List the outputs of cost estimation?

- Manpower loading - number of personnel (which also includes management personnel) that are allocated to the project as a function of time.
- Project duration - time that is needed to complete the project.
- Effort - amount of effort required to complete the project and is usually measured in units as man-months (MM) or person-months (PM).

12. What is Cost Estimation Accuracy?

The cost estimation accuracy helps to determine how well or how accurate our estimation is when using a particular model or technique. We can assess the performance of the software estimation technique by:

- Absolute Error ($E_{pred} - E_{act}$)
- Percentage or Relative Error $(E_{pred} - E_{act}) / E_{act}$
- Mean Magnitude of Relative Error

13. List out the methods of cost estimation.

- Algorithmic (Parametric) model
- Expert Judgment (Expertise Based)
- Top - Down
- Bottom - Up
- Estimation by Analogy
- Price to Win Estimation

14. Define COCOMO.

COCOMO stands for Constructive Cost Model; it is a software cost estimation model. It is an algorithmic approach to estimating the cost of a software project. By using COCOMO you can calculate the amount of effort and the time schedule for projects. From these calculations you can then find out how much staffing is required to complete a project on time. COCOMO's main metric used for calculating these values is lines of code, function points (FP), or object points (OP).

15. List the objectives of COCOMO II.

- To develop software cost database and tool support capabilities for continuous model improvement
- To provide a quantitative analytic framework, and set of tools and techniques for evaluating the effects of software technology improvements on software life cycle costs and schedules

16. List the models in COCOMO II.

- Application Composition Model – this would be used for projects built using rapid application development tools. Normally you would use object points for size estimates. It “involves prototyping efforts to resolve potential high-risk issues such as user interfaces, software/system interaction, performance, or technology maturity.”

- Early Design Model – This model can provide you with estimates early in a projects design before the entire architecture has been decided on. Normally you would use function points as a size estimate. It “involves exploration of alternative software/system architectures and concepts of operation. At this stage, not enough is generally known to support fine-grain cost estimation.”
- Post-Architecture Model – The most detailed on the three, used after the overall architecture for the project has been designed. You could use function points or LOC’s for size estimates. It “involves the actual development and maintenance of a software product”

17. Name any two levels of COSMIC model.

The COSMIC method may be used to size software such as business applications; real-time software; infrastructure software such as in operating systems.

The common characteristic of all these types of software is that they are dominated by functions that input data, store and retrieve data, and output data.

18. Define Staffing pattern.

To complete a software project has been estimated, the staffing requirement for the project can be determined.

Putnam’s work

Norden’s work

19. Core values of Extreme programming

1. Communication and feedback
2. Simplicity
3. Responsibility
4. Courage.

20. List agile approach.

1. Crystal Technologies
2. Atern
3. Scrum
4. Extreme Programmig

PART-B

1. Explain rapid application development.
2. Illustrate Extreme Programming.
3. Describe SCRUM.
4. Explain Effort and cost estimation techniques.
5. Describe COSMIC full function points.
6. Explain COCOMO 2 parametric productivity model.

UNIT-III:ACTIVITYPLANNING AND RISK MANAGEMENT

PART-A

1. What are the steps involved in Activity Planning?

- Ensure that the appropriate resources will be available precisely when required.
- Avoid different activities competing for the same resources at the same time.

- Produce a detailed schedule showing which staff carry out each activity.
 - Produce a time/cash flow forecast.
2. What are the objectives of activity planning? (Nov/Dec 2012)(May/Jun 2013)
- Feasibility assessment
 - Resource allocation
 - Detailed costing
 - Motivation
 - Co-ordination
3. Define resource allocation.
- What are the most effective ways of allocating resources to the project. When should the resources be available? The project plan allows you to investigate the relationship between timescales and resource availability.
4. How will you define the activities?
- A project is composed of a number of interrelated activities.
 - A project may start when at least one of its activities is ready to start.
 - A project will be completed when all of the activities it encompasses have been completed.
 - If an activity must have a clearly defined start and a clearly defined end-point normally marked by the production of a tangible deliverable.
5. What are the three different approaches to identifying the activities?
- Activity-based approach - constraints stemming from the relationships between projects
 - Product-based approach - instructor becomes an active member of the project team
 - Hybrid approach - Decision support system for *software project management*.
6. Write short notes on WBS. (Nov 2014/Nov 2015)
- This involves identifying the main tasks required to complete a project and then breaking each of these down into sets of lower-level tasks.
7. How will you formulate the network model?
- The first stage in creating a network model is to represent the activities and their interrelationships as a graph. Then constructing the precedence networks.
8. What are the rules for constructing precedence networks?
- A project network should have only one start node.
 - A project network should have only one end node.
 - A node has duration. Links normally have no duration.
 - Precedents are the immediate preceding activities.
 - Time moves from left to right
 - A network may not contain loops.
 - A network should not contain dangles.
9. Define Hammock activities.
- Hammock activities which, in themselves, have zero duration but are assumed to start at the same time as the first 'hammocked' activity and to end at the same time as the last one.

10. What is meant by forward pass?

The forward pass is carried out to calculate the earliest dates on which each activity may be started and completed. Significance-calculation method used in Critical Path Method.

11. What is meant by backward pass?

This second stage in the analysis of a critical path network is to carry out a backward pass to calculate the latest date at which each activity may be started and finished without delaying the end date of the project. The calculating the latest dates, we assume that the latest finish date for the project is the same as the earliest finish date—that is, we wish to complete the project as early as possible.

12. What are the rules of activity-on-arrow rules and conventions? (Nov/Dec 2011)

- A project network may have only one start node
- A project network may have only one end node
- A link has duration. Nodes have no duration
- Times move from left to right. Nodes are numbered sequentially
- A network may not contain loops.

13. Define Risk. (Nov/Dec 2011)

“An uncertain event or condition that, if it occurs, has a positive or negative effect on a project objective” . include transferring the risk to another party, avoiding the risk, reducing the negative effect of the risk, and accepting some or all of the consequences of a particular risk.

14. What are things to be considered in risk management? (Nov/Dec 2012)

- Risk Identification - Organizations and project teams
- Risk Analysis - Includes a download demo and other Decision analysis tools
- Risk Planning - assessment is an important part
- Risk Monitoring - identify Development Environment Risks.

15. Define Risk Identification.

Risk management begins with analyzing the risks involved in the project. Risk identification is not a one-off initiative since projects are constantly evolving and new risks arise while other risks may dissipate or reduce in importance.

16. Define risk analysis and risk monitoring.

Risk Analysis considers each identified risk and makes a judgment about the probability and seriousness of it

Risk Monitoring involves regularly assessing each identified risk to decide whether that risk is becoming more or less probable and whether the effect of the risk has changed.

17. Define Risk Planning.

This project will develop the high-performance, computational technology infrastructure needed to analyze the past, present, and future geospatial distributions of living components of Earth environments.

18. What are the steps in risk planning?

- Risk identification
- Risk analysis and prioritization.
- Risk planning

- Risk monitoring.
19. Define risk assessment.
Using this formula

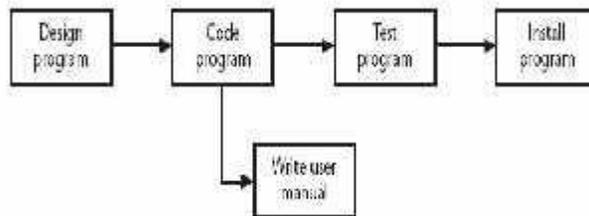
$$\text{Risk exposure} = (\text{potential damage}) * (\text{probability of occurrence})$$

20. What are called “Free floats” and “interfering floats”? how are they calculated? (May 12, 16)

Total float is the amount of time by which an activity may be delayed without delaying the project completion. Free float is that part of total float which can be used without affecting floats of the succeeding activities.

21. What is a “Dangle” in an activity network? show an example? (May Jun/2012)

A dangling activity such as “write user manual” should not exist as it is likely to lead to errors in subsequent analysis



PART-B

1. What are the objectives of activity planning?
2. Explain the approaches for identifying the activities. (Nov 2014)
3. Explain in detail formulating a network model. (May 2012, Nov 2012, 2015)
4. What is the difference forward pass and backward pass explain with example. (Nov 2014 / Apr 2015)
5. Explain activity-on-arrow networks. (May/Jun 2013/Apr 2015)
6. What are the approaches in risk identification? (Apr 2015)
7. Explain the risk planning. (May/Jun 2012/Nov/Dec 2012/Nov 2015/Apr 2014)
8. How to evaluate the PERT techniques. (Nov/Dec 2011/Apr 2014/Nov 2015/Apr 2016)
9. Explain with an example how critical path can be identified in precedence networks? (Nov/Dec 2011) (May/Jun 2013)

UNIT-IV: PROJECT MANAGEMENT AND CONTROL

PART-A

1 Write notes on monitoring and control. (Apr 2014)

Monitoring is collecting and reporting information concerning previously defined project performance elements.

Control uses the information supplied by the monitoring techniques in order to bring project actual results in line with stated project performance standards.

2 What are the three steps in project control? (May/Jun 2013/Nov 2015)

- Measuring & Monitoring
- Identifying/tracking key performance metrics
- Evaluating
- Analyzing causes of problems and potential corrective actions
- Correcting
- Taking corrective actions to bring project performance back in line with goals

3 What are the functions in traffic light-method?

- Identify the key 2) Break these key elements into constituent
- Assess each of these second-level elements on the scale green for on target
- Review all these second-level assessments to arrive at first-level assessments.
- Review first- and second-level assessments to produce an overall Assessment.

4 Define Gantt Chart

One of the simplest and oldest techniques project progress is the Gantt chart. This is essentially an activity bar chart indicating scheduled activity dates and duration frequently augmented with activity floats.

5 Define slip chart. (Nov 2014)

A slip chart is a very alternative favoured by some project managers who believe it provides a more striking visual indication of those activities that are not progressing to schedule the more the slip line bends, the greater variation from the plan.

6 Write short notes on Earned Value Analysis. (Nov/Dec 2011)

- It is a measure of progress
- It enables us to assess the “percent of completeness” of a project using quantitative analysis rather than rely on a gut feeling
- “Provides accurate and reliable readings of performance from as early as 15 percent into the project.”
- A technique used to help determine and manage project progress and the magnitude of any variations from the planned values concerning cost, schedule, and performance.

7 Define Scheduled variance.

The schedule variance is measured in cost terms as EV - PV and indicates the degree to which the value of completed work differs from that planned.

8 What are the deciding levels of monitoring? (May/Jun 2013)

- Critical path activities
- Activities with no free float
- Activities with less than a specified float
- Activities using critical resources
- High risk activities.

9 What are the steps in change control procedures? (Apr 2014)

- One or more users might perceive a need for a modification to a system and ask for a change request to be passed to the development staff.
- The user management considers the change request and, if they approve it,
- pass it to the development management.

10 Define managing contracts.

Contract management or **contract administration** is the management of contracts made with customers, vendors, partners, or employees. Contract management includes negotiating the terms and conditions in contracts and ensuring compliance with the terms and conditions, as well as documenting and agreeing on any changes that may arise during its implementation or execution.

11 What are the different types of contract?

- Fixed price contracts.
- Time and materials contracts.
- Fixed price per delivered unit contracts.

12 What is meant by fixed price contracts?

- involve a fixed total price for a well-defined product or service
- may include incentives for meeting certain performance objectives or penalties if those objectives are not met.

13 Mention the advantages and disadvantages

of fixed price contracts. Advantages

- Known customer expenditure
- Supply motivation
- Higher prices to allow for contingency

Disadvantages

- Difficulties in modifying requirements
- Upward pressure on the cost of changes
- Threat to system quality.

14) Define time and materials contracts. (Nov 2014)

- hybrid of both fixed price and cost reimbursable, often used by consultants
- the buyer pays the seller for both the time and materials required to complete the work
- resembles a cost-reimbursable contract because it is open-ended and full cost of project is not predetermined
- but can resemble a fixed-price contract if unit rates are set

15) What are the advantages and disadvantages of time and materials contracts? Advantages

- Ease of changing requirements.
- Lack of price pressure

Disadvantages

- Customer liability
- Lack of incentives for supplier.

16) Define fixed per unit delivered contracts.

- require the buyer to pay the seller a predetermined amount per unit of service
- Detailed requirements analysis done and frozen before starting the contract
- Any change after then, need renegotiating.

17 What are the advantages and disadvantages of fixed per unit delivered contracts? Advantages

- Customer understanding
- Comparability
- Emerging functionality
- Supplier efficiency
- Life-cycle range

Disadvantages

- Difficulties with software size measurements
- Changing requirements.

18 What are the processes of evaluation needed?

- Security of the proposal documents
- Interviewing supplier's representatives.
- Demonstrations.
- Practical tests.

19 What are the services to be provided in contracts?

- Training
- Documentation
- Installation
- Conversion of existing files
- Maintenance agreements
- Transitional insurance agreements.

20 Write any two advantages of function point analysis (Nov/Dec 2011)

- Improved project estimating;
- Understanding project and maintenance productivity;
- Managing changing project requirements;
- Gathering user requirements.

21 List the important roles of the configuration librarian (May/Jun 2012).

A configuration librarian is the owner of the configuration library and manager of all master copies of configuration items (CIs). In a multi-customer environment, a configuration librarian is a superuser for the accounts he or she is assigned to.

A configuration librarian has the following responsibilities:

- Make sure the CIs registered in the database are correct and up to date
- Configure discovery
- Create CIs
- Update a CI instance
- Delete a CI
- Register a new CI
- Transfer ownership of a CI
- Transition a CI state

- Assign or remove CIs to or from an organization
- Create extended attributes for a CI type
- View CIs
- Generate a configuration management report

22 Name the popular visual tools used for monitoring and tracking the project progress. (May/June 2012).

- PERT
- CPM

PART-B

1. Explain project control cycle in detail.
2. Explain the method Earned Value Analysis. (Nov/Dec 2011/Apr 2014/Nov 2014/Apr 2015/Apr 2016)
3. Explain the change in control procedures. (Nov/Dec 2011/May/June 2012/Nov 2014)
4. Explain the different types of contract in detail. (May/June 2012, 2013, 2014)
5. Explain fixed price contracts with advantages and disadvantages. (May/June 2012)
6. Explain time and material contract with advantages and disadvantages
7. What are the stages in contract management? (Nov/Dec 2011/May 2013/Apr 2014/Nov 2015/Apr 2016)
8. Explain Fixed price per deliver unit with advantages and disadvantages
9. Describe the various ways in visualizing the progress of the project. (Nov/Dec 2012/May 2013, 2015)
10. Explain the process of prioritizing monitoring. Give example. (Nov 2012)(May 2013)

UNIT-V:S

STAFFING IN SOFTWARE PROJECTS

PART-A

1. **What are the objectives of managing people and organizing teams? (Apr 2014)**
 - Identify some of the factors that influence people's behavior in project.
 - Select and induct new staff into a project.
 - Increase staff motivation.
 - Improve group working.
 - Use the most appropriate leadership styles.
2. **What are the three basic objectives of organizational behavior. (Apr 2014)**
 - To select the best people for the job.
 - To instruct them in the best methods.
 - To give instructions in the form of higher wages to the best workers.
3. **What are the factors considered in X theory? (May/June 2013)**
 - The average human has an innate dislike of work.

- There is a need therefore for correction, direction and control.
- People tend to avoid responsibility.

4 What are the factors considered in Y theory?

- Work is as natural as rest or play.
- External control and coercion are not the only ways of bringing about effort directed towards an organization's ends.
- The average human can learn to accept and further seek responsibility.

5 Define Motivation.

Motivation is a general term applying to the entire class of drives, desires, needs, wishes, and similar forces. Managers, as a part of motivating their staff, do all such things which they hope will satisfy these drives and desires and induce the subordinates to act in a desired manner.

6 What are the needs in Maslow's hierarchy theory? (May/Jun 2012/Apr 2015)

- Physiological Needs - attention turns to safety and security
- Security or Safety Needs - Calculation, Domain, Consulting,
- Affiliation or Social Needs - Developing New Programs
- Esteem Needs - needs for esteem can become dominant
- Self-actualization Needs - includes symmetry

7 Write short notes on Herzberg's two factor theory. (Nov 2014)

Hygiene factors – which can make you dissatisfied if they are not right.

Motivators – which make you feel that the job is worthwhile.

8 What are the factors to be considered in the Oldham-Hackman job characteristic model?

- Skill variety - one or more of the offerings available from a variety of organizations
- Task variety - enhance Key words
- Task significance - autonomy, and feedback from the job
- Autonomy - for Consulting & Software Companies
- Feedback - submit your comments and suggestions

9 Mention the methods of improving motivation.

Set specific tasks, provide feedback, and consider job design.

10 How to become a team?

- Forming - The members of the group get to know each other and try to set up some ground rules about behaviour
- Storming - one nice packaging, all for publishing need
- Norming - Asset Management is a powerful and complete asset management solution
- Performing - Optimize project delivery across the software
- Adjourning - added a final stage

11 Define Forming.

The members of the groups get to know each other and try to set up some ground rules about behaviour.

12 Define team worker.

Skilled at creating a good working environment to manage all the people who are developing Projects, team proposed to extend these concepts.

13 What are the two categorized for Decision making?

- Structured- generally relatively simple, routine Decisions where rules can be applied in a fairly straightforward way
- Unstructured- more complex and often requiring a degree of creativity.

14 Mention some mental obstacles to good Decision making. (May/Jun 2013)

- Faculty heuristics- is an innovative effort by students and members of staff
- escalation of commitment- behavior, sunk cost, risk propensity, risk perception,
- information overhead- develop, analyze, design, and develop software

15 What are the measures to reduce the disadvantages of group Decision making?

- The cooperation of a number of experts.
- The problem is presented to the experts.
- The experts record their recommendations.
- These recommendations are collated and reproduced.
- The collected responses are recirculated.

16 Define Leadership.

The ability of a superior to influence the behavior of his subordinates and persuade them to follow a particular course of action, do suggest here is that any analysis of project management.

17 What are the leadership styles?

- Directive autocrat,- This manager makes all the Decisions unilaterally and manages Learning to Lead
- permissive autocrat- Concepts using simple and precise free downloadable
- directive democrat- Management Styles Permissive Democrat Directive Autocrat document
- permissive democrat- Makes Decisions participative subordinates have latitude.

18 Define Stress. (Nov/Dec 2011/Nov/Dec 2012/Apr 2015)

Projects are about overcoming obstacles and achieving objectives. Almost by definition both the project manager and team members will be under pressure. Once a project gets rolling, you should expect members to be putting in at least 60 hours a week.. the project must except to put in as many hours as possible.

19 What do you understand by “Egoless Programming”. (May/Jun 2012)/Nov 2015)

Egoless programming is a style of computer programming in which personal factors are minimized so that quality may be improved.

24 What is a bespoke system. (Nov/Dec 2012)

Bespoke is a term used in the United Kingdom and elsewhere for an individually- or custom-made product or service. Traditionally applied to custom-tailored clothing, the term has been extended to information technology, especially for software consulting services. Typically, software consulting companies offer packaged (already invented and gener

ally applicable) software and bespoke software for client needs that can't be satisfied by packaged software.

25 What is the use of checkpoints in monitoring. (Nov/Dec 2012/Apr 2016)

- Based on regular time intervals
- Can be weekly or monthly or quarterly
- Depend on what to check and how to
- Based on a particular event
- At the end of each activity
- In the middle of a critical activity
- Should be set before the plan was published

PART-B

1. Explain the step wise framework where staffing concerns are important.
2. Explain the recruitment process. (Nov/Dec 2011 , 2012, May 2013, 2014)
3. Define motivation. Explain Maslow's hierarchy of needs. (Apr 2015/Apr 2016)
4. Explain the expectancy theory of motivation.
5. What are the methods involved in motivation? (Nov/Dec 2011/May/Jun 2013/Nov 2014)
6. What are the steps needed to become a team? (Nov/Dec 2012/Apr 2015)
7. Explain the leadership style in detail. (Nov/Dec 2011/Apr 2015)
8. Explain the organizational structures. (May 2012, 2013, 2016, Nov 2012, 2014)
9. Oldham-Jacobson job characteristic model. (May 2012 , 2015, Nov 2014, 2015)

CS6801 MULTI-CORE ARCHITECTURES AND PROGRAMMING

UNIT – I : MULTI-CORE PROCESSORS

PART - A (2 MARKS)

1. Difference between symmetric memory and distributed architecture.

Symmetric memory: It consists of several processors with a single physical memory shared by all processors through a shared bus

Distributed memory: It is a form of memory architectures where the memories can be addressed as one address space.

2. What is vector instruction?

These are instructions that operate on vectors rather than scalars. if the vector length is vector length, these instructions have the great virtue that a simple loop such as For(i=0;i<n;i++)

$X[i] += y[i];$

Requires only a single load, add and store for each block of vector length elements, while a conventional system requires a load, add and store for each element.

3. What are the factors to increasing the operating frequency of the processor? (i)Memory wall

(ii)ILP wall

(iii)Power wall

4. Comparison between single and multi-core CPU.

PARAMETER	SINGLE-CORE PROCESSOR	MULTI-CORE PROCESSOR
Number of cores on a die	single	multiple
Instruction execution	Can execute Single instruction at a time	Can execute multiple instructions by using multi cores
Gain	Speed up every program	Speed up the programs which are designed for multi-core processors

5. Define – SIMD system

It is a single instruction multiple data systems are operate on multiple data streams by applying the same instruction to multiple data items. It having a single control unit and multiple ALUs. An

Instruction is broadcast from the control unit to the ALUs and each ALU either applies the instruction to the current data item.

6. Define – MIMD system

It is a multiple instruction multiple data systems support multiple simultaneous instruction streams operating on multiple data streams. It consist of a collection of fully independent processing units or cores, each of which has its own control unit and its own ALU.

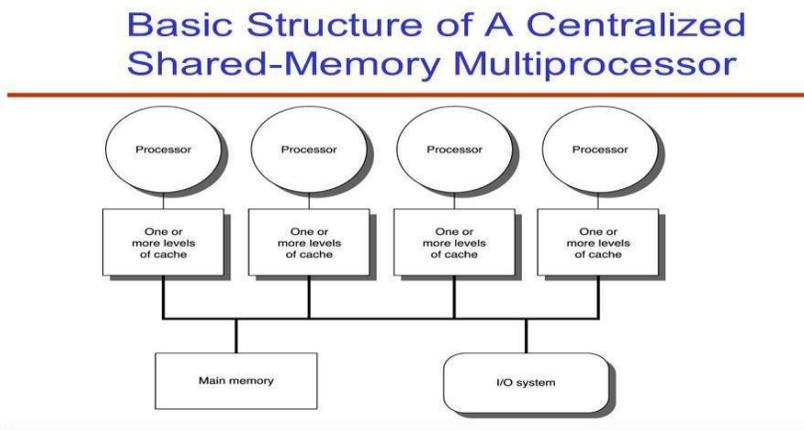
7. Define – Latency

It is the time that elapses between the source’s beginning to transmit the data and the destination’s starting to receive the first byte.

8. Define – Bandwidth

It is a the rate at which the destination receives data after it has started to receive the first byte.

9. Draw neat diagram for structural model of centralized shared-memory multiprocessor.



10. What is called directory based?

Sharing status of a block of physical memory is kept in just one location called the directory.

11. What are the issues available in handling the performance? (i)Speedup and efficiency

(ii)Amdahl’s law

(iii)Scalability

(iv)Taking timings

12. What are the disadvantages of symmetric shared memory architecture?

(i)Complier mechanisms for transparent software cache coherence are very limited.

(ii)Without cache coherence, the multiprocessor loses the advantage of being to fetch and use multiple words, such as a cache block and where the fetch data remain coherent.

13. Write a mathematical formula for speedup of parallel program.

$$\text{Speedup} = T_{\text{serial}} / T_{\text{parallel}}$$

14. Define – False sharing

It is the situation where multiple threads are accessing items of data held on a single cache line.

15. What are multiprocessor systems and give their advantages?

Multiprocessor systems also known as parallel systems or tightly coupled systems are systems that have more than one processor in close communication, sharing the computer bus, the clock and sometimes memory & peripheral devices. Their main advantages are

- Increased throughput
- Economy of scale
- Increased reliability

16. What are the different types of multiprocessing?

Symmetric multiprocessing (SMP): In SMP each processor runs an identical copy of the Os& these copies communicate with one another as needed. All processors are peers. Examples: Windows NT, Solaris, Digital UNIX, OS/2 & Linux

Asymmetric multiprocessing: Each processor is assigned a specific task. A master processor controls the system; the other processors look to the master for instructions or predefined tasks. It defines a master-slave relationship. Example: SunOS Version 4.

17. What are the benefits of multithreaded programming?

The benefits of multithreaded programming can be broken down into four major categories:

1. Responsiveness
2. Resource sharing
3. Economy
4. Utilization of multiprocessor architectures

PART – B (16 MARKS)

1. Explain in detail, the symmetric memory architecture.
2. Explain in detail, the SIMD and MIMD systems.
3. Explain in detail, the distributed memory architecture.
4. Write short notes on parallel program design.
5. Write short notes on single core and multicore processor.
6. Write short notes on parallel program design.
7. Explain in detail, the SIMD and MIMD systems.
8. Explain in detail, the symmetric memory architecture and distributed memory architecture.
9. Write short notes on interconnection networks.

UNIT – II : PARALLEL PROGRAM CHALLENGES

PART – A (2 MARKS)

1. Define race condition.

When several process access and manipulate same data concurrently, then the outcome of the execution depends on particular order in which the access takes place is called race condition. To avoid race condition, only one process at a time can manipulate the shared variable

2. What is a semaphore?

A semaphore 'S' is a synchronization tool which is an integer value that, apart from initialization, is accessed only through two standard atomic operations; wait and signal. Semaphores can be used to deal with the n-process critical section problem. It can be also used to solve various synchronization problems.

The classic definition of 'wait'wait (S) {
while (S<=0) ; S--; } The classic definition
of 'signal'signal (S) { S++; }

3. Define deadlock

A process requests resources; if the resources are not available at that time, the process enters a wait state. Waiting processes may never again change state, because the resources they have requested are held by other waiting processes. This situation is called a deadlock.

4. What are conditions under which a deadlock situation may arise?

A deadlock situation can arise if the following four conditions hold simultaneously in a system: a. Mutual exclusion

- Hold and wait
- No pre-emption

5. What are the methods for handling deadlocks?

The deadlock problem can be dealt with in one of the three ways:

- Use a protocol to prevent or avoid deadlocks, ensuring that the system will never enter a deadlock state.
- Allow the system to enter the deadlock state, detect it and then recover.
- Ignore the problem all together, and pretend that deadlocks never occur in the system

6. Define – Data race

It is the most common programming error found in parallel code. A data race occurs when multiple threads use the same data item and one or more of those threads are updating.

7. Define – livelock

A livelock traps threads in an unending loop releasing and acquiring locks. livelocks can be caused by code to back out of deadlocks.

8. Define– thread. Mention the use of swapping.

Thread is placeholder information associated with a single use of a program that can handle multiple concurrent users. From the program's point-of-view, a thread is the information needed to serve one individual user or a particular service request. The purpose of swapping, or paging, is to access data being stored in hard disk and to bring it into the RAM so that it can be used by the application program.

9. What is the use of pipe?

The symbol | is the Unix pipe symbol that is used on the command line. What it means is that the standard output of the command to the left of the pipe gets sent as standard input of the command to the right of the pipe. Note that this functions a lot like the > symbol used to redirect the standard output of a command to a file. However, the pipe is different because it is used to pass the output of a command to another command, not a file.

10. What are signals? What system calls use signals in unix?

```
sighandler_t signal(int signum, sighandler_t handler);
```

Description: The behavior of signal() varies across UNIX versions, and has also varied historically across different versions of linux.

11. Define – Signal

Signals are a UNIX mechanism where one process can send a signal to another process and have a handler in the receiving process perform some task upon the receipt of the message

12. Define – Message queue

A message queue is a structure that can be shared between multiple processes. Messages can be placed into the queue and will be removed in the same order in which they were added. Constructing a message queue looks rather like constructing a shared memory segment

13. Define – region of code

The region of code between the acquisition and release of a mutex lock is called a Critical section. Code in this region will be executed by only one thread at a time.

14. Define – Hotlocks

It is one of the common causes of poor application scaling. This comes about when there are too many threads contending for a single resource protected by a mutex.

15. Define – Hardware Prefetching

It is a Data streams is where part of the processor dedicated to detecting streams of data being read from memory

PART – B (16 MARKS)

1. Explain in detail, the data races
2. Write short notes on locks, semaphore and mutex.
3. Explain in detail, the linear scaling
4. Write short notes on signals, events, message queues and named pipes.
5. Explain in detail, the tools used for detecting data races.
6. Explain in detail, the super linear scaling.
7. Write short notes on locks, semaphore and mutex
8. Explain in detail, the importance of algorithmic complexity.
9. Write short notes on signals, events, message queues and named pipes.

UNIT – III : SHARED MEMORY PROGRAMMING WITH OpenMP

PART – A (2 MARKS)

1. What is termed as initial task region?

An initial thread executes sequentially, as if enclosed in an implicit task region called an initial task region that is defined by the implicit parallel region surrounding the whole program.

2. List the effect of cancel construct.

The cancel construct depends on its construct-type clause. If a task encounters a cancel construct With a task group construct-type clause, then the task activates cancellation and continues execution at the end of its task region, which implies completion of that task.

3. Define - thread private memory

The temporary view of memory allows the thread to cache variables and thereby to avoid going to memory for every reference to a variable. Each thread also has access to another type of memory that must not be accessed by other threads called thread private memory.

4. How does the run-time system know how many threads to create?

The value of an environment variable called OMP_NUM_THREADS provides a default number of threads for parallel sections of code.

5. Define-shared variable

A shared variable has the same address in the execution context of every thread. All threads have access to shared variables.

6. Define-private variable

A private variable has a different address in the execution context of every thread. A thread can access its own private variables, but cannot access the private variable of another thread.

7. List the restrictions to array.

- An array section can appear only in clauses where it is explicitly allowed.
- An array section can only be specified for a base language identifier.

8. List the restrictions to parallel construct.

- A program that branches into or out of a parallel region is non-conforming.
- A program must not depend on any ordering of the evaluations of the clauses of the parallel directive, or on any side effects of the evaluations of the clauses.

9. List the restrictions to worksharing constructs.

- Each work-sharing region must be encountered by all threads in a team
- The sequence of work-sharing regions and barrier regions encountered must be the same for every thread in a team.

10. List the restrictions to sections constructs.

- The code enclosed in a sections construct must be a structured block.
- Only a single no wait clause can appear on a sections directive.

11. Define – Pragma

A compiler directive in c or c++ is called a pragma. The word pragma is short for pragmatic information. A pragma is a way to communicate information to the compiler. The information is nonessential in the sense that the compiler may ignore the information and still produce a correct object program. However, the information provided by the pragma can help the compiler to optimize the program.

PART – B (16 MARKS)

1. Explain in detail, the OpenMp execution model.
2. Write short notes on functional and general data parallelism.
3. Write short notes on functional parallelism.
4. Write short notes on work-sharing constructs.
5. Explain about loop handling.
6. Explain about open MP directives.
7. Explain about open MP memory model.

UNIT – 4 : DISTRIBUTED MEMORY PROGRAMMING WITH MPI

PART – A (2 MARKS)

1. Define – MPI

Message passing programs, a program running on one core-memory pair is usually called a process, and two processes can communicate by calling functions: one process calls a send function and the other calls a receive function. The implementation of message passing that will be using is called MPI, which is an abbreviation of Message Passing Interface. MPI is not a new programming language. It defines a library of functions that can be called from c,c++.

2. What is collective communications?

Some global communication functions that can involve more than two processes. These functions are called collective communications.

3. What is the purpose of wrapper script?

A wrapper script is a script whose main purpose is to run some program. In this case, the program is the c compiler. However, the wrapper simplifies the running of the compiler by telling it where to find the necessary header files and which libraries to link with the object file.

4. List out the functions in MPI to initiate and terminate a computation.

MPI_INIT	:	Initiate an MPI computation
MPI_FINALIZE	:	Terminate a computation
MPI_COMM_SIZE	:	Determine number of processes
MPI_COMM_RANK	:	Determine my process identifier
MPI_SEND	:	Send a message
MPI_RECV	:	Receive a message

5. What is communicator in MPI?

MPI a communicator is a collection of processes that can send messages to each other. One of the purposes of MPI_Init is to define a communicator that consists of all of the processes started by the user when she started the program. This communicator is called MPI_COMM_WORLD.

6. Brief the term collective communication?

some "global" communication function that can involve more than two processor. these function are called collective communication. in the process of learning about of these MPI function.

7. What is the purpose of wrapper script?

A wrapper script is a script whose main purpose is to run some program. In this case the program in the c compiler. However the wrapper is simplified the running of the compiler by telling it where to find the necessary header files and which libraries to link with object file.

8. What are the different categories of pthread?

*mutexes

*condition variables

*synchronization between threads using read/write locks and barriers.

9. What are the reasons for parameter

threads_in_cond_wait used in tree search? *when its less than thread_count it tells us how many threads are waiting

*when its equal to thread_count it tells us that all the threads are out and its time to quit.

10. What are the modes message passing interfaces for send

functions? MPI provides four modes for

sends: standard(MPI_send), synchronization(MPI_send), ready(MPI_Rsend) and buffered(MPI_Bsend).

11. Brief about MY_avail_tour_count function?

The function MY_avail_tour_count can simply return the size of the process. It can also make use of a "cut of length" when a partial tour has already visited most of the cities there will be very little work associated with the sub tree at the partial tour.

PART – B (16 MARKS)

1. Explain in detail, the libraries for group of processes and virtual topologies.
2. Write short notes on collective communication.
3. Write short notes on point-to-point communication.
4. Explain in detail, the MPI constructs of distributed memory.
5. Explain in detail, the MPI program execution.
6. Explain about MPI derived datatypes.
7. Explain virtual memory in detail.
8. Explain about performance evaluation.

UNIT – V: PARALLEL PROGRAM DEVELOPMENT

PART – A (2 MARKS)

1. Define the term linear speedup?

The ideal value for $s(n,p)$ is p . If $s(n,p)=p$ then parallel program with $comm_sz=p$ processes is running p times faster than the serial program. In practice this speedup, sometimes called linear speedup, is rarely achieved. Matrix-vector multiplication program got the speedups.

2. Brief about strongly and weakly scalable?

Recall that program that can maintain a constant efficiency without increasing the problem size are sometimes said to be strongly scalable. Programs that can maintain a constant efficiency if the problem size increase at the same rate as the number of processes are sometimes said to be weakly scalable.

3. Define the term broadcast in collective communication?

A collective communication in which data belonging to a single process is sent to all of the processes in the communication is called a broadcast.

4. Brief about MPI_ALL_reduce and their representation?

If we use a tree to compute a global sum, we might "reverse" the branches to distribute the global sum. Alternatively, we might have the processes exchange partial results instead using one-way communication such as a communication pattern is sometimes called a butterfly.

5. List the function of group accessors?

`MPI_GROUP_SIZE(group, size)`

`MPI_GROUP_RANK(group, rank)`

`MPI_GROUP_TRANSLATE_RANK(group1, n, rank1, group2, rank2)`

`MPI_GROUP_COMPARE(group1, group2, result)`

6. How to represent any collection of data items in MPI?

Derived data type can be used to represent any collection of data items in memory by storing both the types of the items and their relative locations in memory. The idea here is that if a function that sends data knows the types and the relative locations in memory of a collection of data items it can collect the items from memory before they are sent. Similarly, a function that receives data can distribute the items into their correct destinations in memory when they are received.

7. How will calculate elapsed time in MPI?

```
double start, finish;
start=MPI_Wtime();
/*code to be timed*/
.....
finish=MPI_Wtime();

printf("proc%d>elapsed time =%e seconds\n", my_rank, finish-start);
```

8. What are the features of blocking and non blocking in point-to-point communication?

*blocking send or receive

*call does not return until the operation has been completed.

*allows you to know when it is safe to use the data received or reuse the data sent.

NON BLOCKING SEND OR RECEIVE

*call returns immediately without knowing if the operation has been completed.

*less possibility of dead blocking code

*used with MPI_wait or MPI_test

9. Brief about communication in MPI?

MPI communication is a collection of processes that can send message to each other. One of the purposes of MPI_INIT is to define a communication that consists of all of the processes started by the user when she started the program. This communication is called MPI_comm_WORLD

10. Write about FULLFILL_request function?

If a process has enough work so that it can usefully split its stack, it calls fullfill_request. fullfill_request MPI_Iprobe to check for a request for work from another processes. If there is a request, it receives it, splits stack and sends work to the requesting processes.

11. What is graph?

A graph is a collection of vertices and edges on line segment joining pair of vertices $g(v,e)$.

12. What is directed graph?

In a directed graph or digraph, the edges are oriented - one of each edge is the tail and other is the head.

13. Why digraph is used in travelling sales man problem?

The vertices of the digraph corresponds to the cities in an instances of the travelling salesman problem, the edges correspond to routes between the cities and the labels on the edges correspond to the costs of the routers.

14. How to find least cost in TSP?

once of the most commonly used is called depth first search. In depth first search probe as deep as can into the tree. after either reached a leaf or found a tree node that can't possibly lead to a least cost tour, back up to the deepest "ancestor" tree node with unvisited children and probe one of its children as deep as possible.

PART – B (16 MARKS)

1. Explain in detail, the performance of MPI solvers.
2. Explain in detail, the parallelizing tree search using pthreads.
3. Explain n-body solvers.
4. Explain in detail various tree search algorithm used for parallel program development.
5. Explain parallelizing tree search algorithms.
6. Explain about tree search with pseudo code for a recursive solution to TSP using DFS.
7. How will you parallelize the reduced solver using openMP?