UNIT–3 : Guidelines, Heuristics and Evaluation (PYQ Solution)

PART–A Answers (≈70 Words Each)

Q1. Define Norman's model of interaction. / What are the two major steps in Norman's model of interaction? (2022, Feb 2024)

Norman's model of interaction (execution-evaluation cycle) describes how a user achieves a goal through seven stages: goal, intention, action sequence, execution, perception, interpretation and evaluation. Its two major steps are execution (doing the action) and evaluation (judging the system's response against the goal).

Q2. What are the benefits and limitations of heuristic evaluation? (2024)

Benefits: cheap and fast, needs no users, usable early on prototypes, finds many problems with 3 to 5 evaluators.
Limitations: depends on evaluator skill, can miss problems that only real users meet, may report false alarms, and heuristics may not fit a new domain.

PART–B Answers (≈250 Words Each)

Q1. Explain in detail about the evaluation techniques. (2022)

Evaluation checks whether a design meets user needs and usability goals. It is **formative** (during design, to improve) or **summative** (on the final product, to judge).

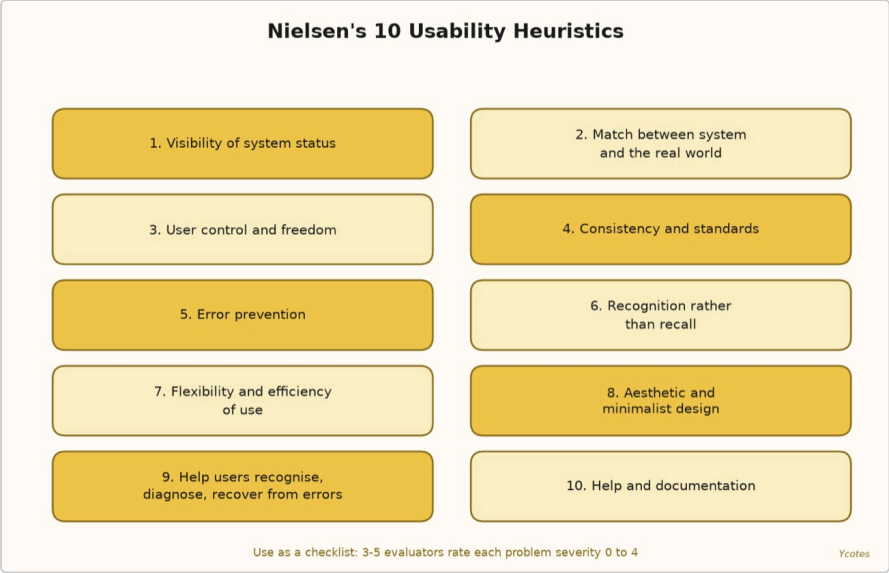
Type	Techniques
Expert (analytical)	Heuristic evaluation, cognitive walkthrough, model-based evaluation (KLM, GOMS)
User-based (empirical)	Usability testing, think-aloud, observation, interviews, questionnaires, controlled experiments
Field and lab	Contextual inquiry and field studies in real settings; controlled laboratory tests

Heuristic evaluation: experts check the interface against usability heuristics.
Cognitive walkthrough: an expert steps through a task as a new user, asking four questions at each step.
Model-based evaluation: predicts task time with KLM, GOMS or Fitts' law.
Usability testing: real users do tasks while observers record time, errors and comments.
Think-aloud: users speak their thoughts while working.
Questionnaires and interviews: collect satisfaction and opinions.

Choosing: use expert methods early (cheap, no users) and user tests later for real behaviour. Often several methods are combined.

Q2. Describe Nielsen's ten heuristics with example of its use heuristics

evaluation. (2022)



#	Heuristic	Example
1	Visibility of system status	Progress bar during upload
2	Match between system and the real world	Trash can icon for delete
3	User control and freedom	Undo and cancel
4	Consistency and standards	Same icon always means the same
5	Error prevention	Confirmation before deleting
6	Recognition rather than recall	Visible menus, recent files
7	Flexibility and efficiency of use	Keyboard shortcuts
8	Aesthetic and minimalist design	No irrelevant information
9	Help users recognise, diagnose and recover from errors	"Password needs 8 characters"
10	Help and documentation	Short searchable help

Use in heuristic evaluation (example: online shopping site):

1. Three evaluators inspect the site separately against the ten heuristics
2. Evaluator 1 finds no progress indicator during payment (heuristic 1)
3. Evaluator 2 finds no way to remove an item from the cart (heuristic 3)
4. Evaluator 3 finds the checkout button labelled differently on two pages (heuristic 4)

5. Each problem is rated for severity from 0 to 4; the payment issue is rated 4
6. Lists are merged and the team fixes the highest severity first

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Q3. What is a cognitive walkthrough, and explain how is it used to evaluate the usability of a product or system? (2024)

A **cognitive walkthrough** is an expert inspection method in which the evaluator steps through the actions needed to do a task, imagining a **new user** learning by exploration, to find learnability problems.

Procedure:

1. Define the users and their knowledge
2. Choose the task and write the correct action sequence
3. Describe the interface for each step
4. At every action ask:
   - Will the user try to achieve the right effect?
   - Will the user notice that the correct action is available?
   - Will the user connect the correct action with the effect they want?
   - After the action, will the user see that progress is made?
5. Record a **success or failure story** for each step, with the reason
6. Suggest fixes (better label, visible control, feedback)

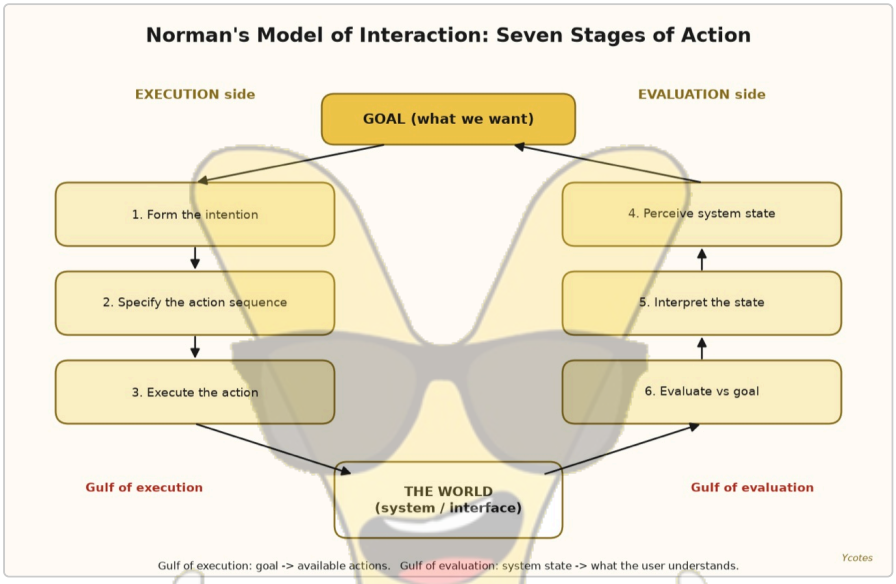
Example: setting an alarm on a phone: if the "+" icon is not noticed, question 2 fails and the fix is a labelled button.

Benefits: cheap, early, focuses on learnability. **Limits:** looks at ease of learning only, tedious for long tasks, no real user data.

PART–C Answers (≈500 Words Each)

Q1. Explain Norman's model of interaction and discuss how it can be used to inform design decisions. Describe the different stages of the model and explain how designers can use the model to identify potential usability problems. (2024)

Norman's model says that a user's activity is a cycle between the user and the world (the system).



Stages:

1. **Goal:** what the user wants (send a message)
2. **Intention:** decide what to do (use the messaging app)
3. **Action sequence:** plan the steps (open, type, press send)
4. **Execution:** perform the actions
5. **Perception:** notice the system's response
6. **Interpretation:** understand what it means
7. **Evaluation:** compare with the goal (message delivered?)

Gulf of execution is the gap between the user's intentions and the actions the system allows. **Gulf of evaluation** is the gap between the system's state and what the user can perceive and understand.

Informing design decisions:

- Make available actions visible (signifiers), narrowing the gulf of execution

- Use natural mappings and constraints
- Give immediate, clear feedback and a visible system state, narrowing the gulf of evaluation
- Provide a clear conceptual model

Identifying usability problems: for every task, check each stage:

Stage	Question	Problem if "no"
Intention and plan	Can the user see what can be done?	Hidden function
Execution	Are controls easy to use?	Awkward or error-prone control
Perception	Is a response visible?	No feedback
Interpretation	Is it understandable?	Confusing message
Evaluation	Can the user tell the goal is met?	Missing confirmation

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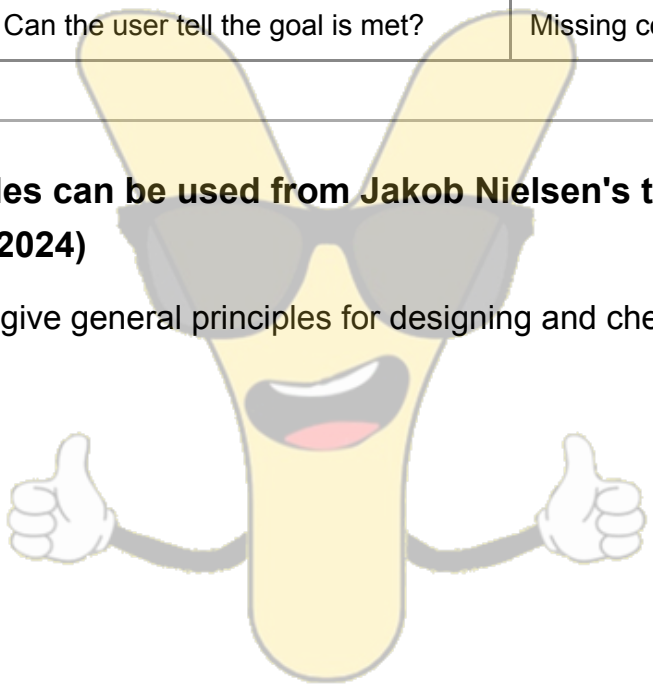
Q2. What principles can be used from Jakob Nielsen's ten usability heuristics? (Feb 2024)

Nielsen's heuristics give general principles for designing and checking interfaces.



#	Principle	How to apply
1	Visibility of system status	Always tell the user what is going on (progress, state)
2	Match with the real world	Use the user's words, concepts and natural order
3	User control and freedom	Provide undo, redo, cancel and exits
4	Consistency and standards	Follow platform conventions; same word, same meaning
5	Error prevention	Constraints, defaults, confirmations before risky actions
6	Recognition rather than recall	Show options and recent items; do not make users remember
7	Flexibility and efficiency	Shortcuts and customisation for experts, simple path for novices
8	Aesthetic and minimalist design	Remove irrelevant information; keep focus
9	Help with errors	Plain-language message, state the problem and a solution
10	Help and documentation	Short, task-based, searchable help

Use: designers apply them while designing and use them as a checklist in **heuristic evaluation**, in which 3 to 5 experts rate each problem's severity from 0 to 4. They are cheap, general and work early on prototypes.

Q3. What are the Shneiderman's eight golden rules? Explain in detail. (Feb 2024)

Ben Shneiderman's eight golden rules guide interface design:

1. **Strive for consistency:** similar situations need similar actions, terms, colours and layouts.
2. **Enable frequent users to use shortcuts:** keyboard shortcuts, macros and function keys speed up expert work.
3. **Offer informative feedback:** every action gets a response; minor actions get modest, major actions get substantial feedback (progress bar, "Saved").
4. **Design dialogs to yield closure:** action sequences have a beginning, middle and end, and the user is told when finished ("Order placed").
5. **Offer simple error handling:** design so users cannot make serious errors; if they do, give simple, constructive, specific messages.

6. **Permit easy reversal of actions:** undo and redo reduce anxiety and encourage exploration.
7. **Support internal locus of control:** users should feel in charge, with the system responding to them, not surprising them.
8. **Reduce short-term memory load:** keep displays simple, consolidate pages, and rely on recognition (the limit is about seven plus or minus two items).

Importance: the rules apply to most interactive systems, are easy to remember and form a base for evaluation.

Q4. Explain cognitive walkthrough. (Feb 2024)

A **cognitive walkthrough** is a usability inspection in which experts walk through the steps of a task from the viewpoint of a **first-time user** to see how easily the interface can be learnt by exploration.

Steps:

1. Identify users, the task and the correct sequence of actions
2. Walk through each action and ask four questions:
   - Will the user try to achieve the right effect?
   - Will the user notice that the correct action is available?
   - Will the user associate the correct action with the effect?
   - Will the user see that progress is being made after the action?
3. Record success or failure stories with causes
4. Fix the problems found (clearer labels, visible controls, feedback)

Advantages: needs no users, done early on a paper prototype, finds learnability problems.
Limitations: limited to ease of learning, time-consuming for long tasks, and depends on the evaluator's view of the user.
