CBSE | DEPARTMENT OF SKILL EDUCATION

DESIGN (SUBJECT CODE 0830)

Marking Scheme for Sample Question Paper
Class XII (Session 2020-2021)

Max. Time: 3 Hours   **Max. Marks: 60**

General Instructions:

1. Please read the instructions carefully.

2. This Question Paper consists of **24 questions** in two sections – Section A& Section B.

3. Section A has Objective type questions whereas Section B contains Subjective type questions.

4. **Out of the given (6 + 18 =) 24 questions, a candidate has to answer (6 + 11 =) 17 questions in the allotted (maximum) time of 3 hours.**

5. All questions of a particular section must be attempted in the correct order.

6. **SECTION A - OBJECTIVE TYPE QUESTIONS (30 MARKS):**

    i. This section has 06 questions.

    ii. There is no negative marking.

    iii. Do as per the instructions given.

    iv. Marks allotted are mentioned against each question/part.

7. **SECTION B – SUBJECTIVE TYPE QUESTIONS (30 MARKS):**

    i. This section contains 18 questions.

    ii. A candidate has to do 11 questions.

    iii. Do as per the instructions given.

    iv. Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

Q. 1	**Answer any 4 out of the given 6 questions on Employability Skills (1 x 4 = 4 marks)**	
i.	_____ communication is sharing of information through typing, printing symbols like letters and numbers. A) Verbal B) Non- verbal C) Written D) Visual Ans. (C) Written	1
ii.	_____ is one of the common uses of internet. A) Electronic mail B) Research C) Downloading file D) All of the above Ans. (D) All of the above	1
iii.	Identify the personality trait of the person who is not interested in social relationships, tends to be distant and is detached and indifferent. A) Obsessive B) Borderline C) Avoidant D) Schizoid Ans. (D) Schizoid	1
iv.	Green jobs for building and construction sectors include- A) Water auditor B) Highway laborers C) Energy auditor D) Destination managers Ans. (B) highway laborers	1
v.	A student internally motivated will complete his task- A) To avoid punishment B) To gain reward C) For personal growth D) To show off Ans. (C) For personal growth	1

vi.	Which of the following is true for entrepreneurs?
	    A) All entrepreneurs have great ideas all the time.
	    B) One must know everything before starting a business.
	    C) A lot of money is required to start any business.
	    D) To be successful, entrepreneurs should be hardworking, energetic and perseverant.
	
	Ans. (D) To be successful, entrepreneurs should be hardworking, energetic and perseverant.
		1

Q. 2	**Answer any 5 out of the given 7 questions (1 x 5 = 5 marks)**	
i	Following is an extract from a case study of internet browsers- "For over a decade, Internet Explorer dominated the web browser landscape, with only Mozilla's Firefox and the MacOS browser Safari offering it any sort of challenge after Microsoft effectively crushed Netscape. This has changed radically since the December 2008 introduction of Google's Chrome, an application that now claims over 40% of the browser market. Speed is probably the single biggest factor in Chrome's success. User studies show that most people find it a lot easier to use Chrome — the "omnibox" can be used for both web addresses and searches. It's also easy to synchronize, meaning that if you use Chrome at home and at work and on another computer, you'll have the same extensions and browser history as long as you're signed in with the same Google account." Why is Chrome the best designed browser? A) User centric approach B) Minimalistic, easy-to-understand design C) Focuses on providing a better experience D) All of the above Ans. (D) All of the above	1
ii	What is the nature of Design Activity? A) Social B) Isolated C) Pair D) None of the Above Ans. A) Social	1
iii	Ideate is the _____ phase of design thinking process. A) First B) Second C) Third D) Last Ans. (C) Third	1

iv	Design thinking is a _____ process. A) Iterative B) Linear C) Circular D) None of the above Ans. A) Iterative	**1**
v	Card sorting can be conducted _____ A) by Mail B) during Workshops C) Electronically D) All of the above Ans. D) All of the above	**1**
vi	Shadowing is a research tool used for _____ people. A) Observing B) Interviewing C) Enquiring D) Discussing Ans. (A) Observing	**1**
vii	During brain storming sessions, people should promote _____. A) Criticizing B) Free Thinking C) Rewarding Ideas D) All of the Above Ans. (B) Free Thinking	**1**

Q. 3	**Answer any 6 out of the given 7 questions (1 x 6 = 6 marks)**	

i	(For Q3 i - iii)
	
	Mr. Patel owns a company which designs and manufactures shoes. He wanted to make a shoe which catered to the needs of full-time working women. His design team understood the needs and wants of the target customer, defined the problem in a user-centric way, brainstormed and mapped the ideas and even made a prototype. Then they launched the new shoe in the market to sell. It did not sell as much as they expected, and had to be taken down from the market.
	
	Which step of the design process did Mr. Patel's company miss?
	
	     A) Empathise
	     B) Define
	     C) Ideate
	     D) Test
	
	Ans. (D) Test
		1

ii	Why is Mr. Patel's company focusing on having a design process?
	     A) Design process is more time consuming and less useful.
	     B) Design process is done only to better the brand image.
	     C) Design process holds no significance at all.
	     D) Design process is done to shape and guide your work and thoughts to improve the outcome.
	
	Ans. (D) Design process is done to shape and guide your work and thoughts to improve the outcome.
		1

iii	What kind of footwear would qualify as a good product for working women of today? A) Comfort only B) Style only C) Both A and B D) There is no need for such a product Ans. (C) Both A and B	1

iii	Proximity can be referred to as grouping of _____
	     A) Similar Objects
	     B) Same Objects
	     C) Different Objects
	     D) All of the above
	Ans. (A) Similar Objects
		1

iv	Which Gestalt principle is followed by the following logo?
	
	     A) Gestalt law of continuity
	     B) Gestalt law of Order and Symmetry
	     C) Gestalt law of figure and ground
	     D) Gestalt law of closure
	
	Ans. (C) Gestalt law of figure and ground
		1

v	Requirement of a good designed product is _____.
	A) Reparability
	  B) Durability
	  C) Compact
	  D) All of the above
	Ans. (D) All of the above
		1

vi	Which of the following are related to Handlooms – A) Pit Loom B) Hand Dying of hanks C) Frame Loom D) All of the above Ans. (D) All of the Above	**1**	

Q. 4	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i	The number which indicates mass per unit length or length per unit mass of yarn is a _____ A) GSM Method B) Count C) Momme D) Pics/inch Ans. (B) Count	**1**
ii	For garment sizing, centimetre is used in - A) US Market B) European Market C) Asian Market D) None of the Above Ans. (B) European Market	**1**
iii	A single crossing of a shuttle from one side of a loom to the other is known as a_____ A) An end B) A pick C) Take Up D) All of the above Ans. (B) A pick	**1**
iv	Mr. X owns a woodwork industry. In the past month, 2 workers in the industry got injured by a machine, and another worker faced respiratory problems. What should be Mr. X's attitude towards the situation? 1. It is a minor issue of 3 out of 70 workers, no real damage was done. 2. The company should not spend time and resources on controlling hazards. 3. Workers should be given a seminar on the proper use of machines. 4. The equipment should be maintained properly.	**1**

		5. Exhaust ventilation and periodic cleaning of entire facility should be ensured. A) 1,2 should be applied B) Only 4 should be applied C) 3,4,5 should be applied D) None of the above Ans. (C) 3,4,5 should be applied	
v		CNC Machine- A) makes precise cuts B) creates beautiful art C) is economical D) none of the above Ans. (A) makes precise cuts	1
vi		_____ is/are the major raw materials of the match industry. A) Wood waste B) Pine Needles C) Casuarina needles D) All of the above Ans. (D) all of the above	1

Q. 5	Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)	
i	Benefit(s) of value addition industries is/are A) Proper storage and utilization B) Proper handling C) Reduce post-harvest losses D) All of the above Ans. (D) all of the above	1
ii	Jointers are wood working machines used to- A) Produce precise holes in pieces of wood B) Flatten and straighten the edges of wood boards C) Shape the timber D) Make intricate circles Ans. (B) flatten and straighten the edges of wood boards	1

iii	Drying stage of furniture production comes after- A) Grinding stage B) Shearing and transport stage C) Execution of individual pieces of furniture D) Selection of materials Ans. (B) Shearing and Transport		1
iv	Pinched fingers are a common injury of which industry- A) Wood industry B) Metal C) Textile D) Plastic Ans. (C) textile		1
v	CAD Pro is professional software for- A) furniture and interior design B) Drafting C) Designing and visualizing D) All of the above Ans. (D) all of the above		1
vi	In plastic industries, safety data sheet should not include- A) Information on correct processing temperature B) Information on degradation products C) Information on any additives and their possible effects on fume production D) Promotion of free usage of all virgin and regrin material. Ans. (D) promotion of free usage of all virgin and regrin material		1

Q. 6	**Answer any 5 out of the given 6 questions (1 x 5 = 5 marks)**	
i	Main aim of ILO is to _____ A) Promote rights at work. B) Encourage decent employment. C) Enhance social protection. D) All of the above. Ans. (D) All of the above	1
ii	COSHH assessments are usually carried out in _____ industry. A) Plastic manufacturing B) Textile C) Metal D) Wood work industry Ans. (A) plastic	1

iii	Green color on Risk matrix indicates_____ A) Unacceptable Risk. B) Acceptable Risk. C) Acceptable with mitigation. D) None of the above. Ans. (B) Acceptable Risk	1
iv	Continuous inhalation of cotton dust results in A) lung disease, coughing and shortness of breath B) heart disease C) dermatitis D) hearing loss Ans. (A) lung disease, coughing and shortness of breath	1
v	Material Safety Data Sheet should not provide information on A) Disposable methods B) Storage conditions C) Spill or leak procedures D) Cost of industry equipment Ans. (D) cost of industry equipment	1
vi	Wood workers in India are exposed to _____ which cause health hazards. A) Formaldehyde and resin B) Polypropylene C) polystyrene D) PVC Ans. (A) Formaldehyde and resin	1

SECTION B: SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills (2 x 3 = 6 marks)
Answer each question in 20 – 30 words.

Q. 7	What is self-motivation? Why is it important? **Answer:** Self-Motivation is a sense of trusting one's own abilities and oneself. Self-motivated individuals are an asset to the world; self-motivated individuals have elevated spirit and are full of positivity. They are focused on their goals and objectives. They take initiatives and thus keep themselves active.	2
Q. 8	Mention any two positive skills of listening. **Answer:** An active listener does the following – Avoids interrupting at all costs. Summarizes and repeats back what he/she has heard. They also observe body language to get an extra level of understanding.	2

Q. 9	Write two advantages of spreadsheet software. **Answer:** 1. Large volume of data can be easily handled and manipulated 2. Data can be imported to or exported from other software 3. Data can be easily represented in pictorial forms like graphs and charts 4. Built-in functions make calculations easier, faster and more accurate.	**2**
Q. 10	What are renewable resources? **Answer:** It is a natural resource which will replenish to replace the portion depleted by usage and consumption. It can be used repeatedly and has endless supply such as solar energy, wind energy and geothermal pressure.	**2**
Q. 11	Enlist the qualities of an entrepreneur and explain any one. **Answer:** **Hard working:** In order to be successful, an entrepreneur must be very hard working. Successful entrepreneurs adapt to the habit of hard work from a very early stage. **Optimistic:** Successful entrepreneurs should have a positive approach to life. They should not be afraid of any adverse situations in business. They should think optimistically about the future of the business. **Independent:** Successful entrepreneurs like to function at their own will and rules. They dislike being guided by others. They do not prefer working for others and are the masters of their own. **Energetic:** Entrepreneurs should possess a high level of energy as they have to put in more hard work and time for making their venture a success. **Self-confident:** An entrepreneur should have a strong belief in his/her abilities. He must not deviate from his/her decisions too early in case success is delayed rather he must trust his/her competencies and hard work. **Perseverant:** Successful entrepreneurs never quit his/her venture even if she/he fails. They keep on finding ways to succeed. They show perseverance in their pursuit. They never give up easily. *(Explain Any One)*	**2**

Answer any 3 out of the given 5 questions in 20 – 30 words each (2 x 3 = 6 marks)

Q. 12	Define Ideation stage and how Brainstorming sessions help to generate ideas. **Answer:** Ideation is a part of the design process. Ideation is the process where we generate ideas and solutions through sessions such as sketching, prototyping, brainstorming, writing worst possible ideas and more ideation techniques. Ideation is also the third stage in the Design Thinking process. The strength of brainstorming is that the potential participants draw associations between their ideas in a free thinking environment, thereby broadening the solutions. Brainstorming combines a relaxed informal approach to problem solving with lateral thinking. It encourages people to come up with thoughts and ideas. Some of these ideas can be crafted into original, creative solutions to a problem. This helps to get people unstuck by "jolting" them out of their normal ways of thinking.	**2**

Q. 13	Define Gestalt's Law of Closure.	**2**
	Answer: Gestalt's Law of Closure	
	Our minds tend to fill in missing information and ignore gaps to create familiar shapes and images.	
	The closure principle dictates that a complete outline isn't necessary to convey the same message as a partial outline. Even if parts are missing, the human psyche will make every attempt to match it to a known object just as long as a designer includes enough information that viewers can fill in the gaps. If too much is missing, the design will instead appear as its separate parts.	
Q. 14	Write any three softwares used in the field of furniture design.	**2**
	Answer: Furniture design software allows you to create amazing furniture items on your PC. Whether working as a furniture designer or simply wanting to design furniture for oneself, these tools help in making the process simple and efficient-	
	1. SolidWorks: It is very versatile furniture design software that you can use for living rooms, dining rooms, bed rooms and offices. The CAD models support a wide variety of materials, including stainless steel furniture, wooden furniture, as well as custom design furniture.	
	2. CAD Pro: It is drafting software that allows one to design, visualise, and share furniture design ideas. This can be used to design any piece of furniture, from classic tables to extravagant chairs.	
	3. Pro 100: It is professional software for interior and furniture design. This tool allows one to design the interior of kitchens, bathrooms and living rooms faster and more efficiently. One of the main strong points of this tool is the quality of visualisation. The crystal-clear images from Pro 100 renders are very useful, allowing the user to spot even the tiniest design details.	
Q. 15	How do inattentive or poorly trained weavers face dangers in the textile industry?	**2**
	Answer: The dangers include the moving reed, the frames which hold the headers and "pinch" or "sand" roll utilized to keep the cloth tight as it passes over the front of the machine and onto the doff roll. The most common injury in weaving is pinched fingers from distracted or bored workers. Weavers with long hair getting it tangled in the warp itself and having their scalp pulled away from the skull or large chunks of hair pulled off. Due to possible pinch points on the front of machines loose baggy clothing is prohibited. The loud nature in which weave mills operate, it is nearly impossible to hear a person calling for help when entangled.	
Q. 16	Write any two health hazards experienced by the wood workers in India.	**2**
	Answer: Wood workers in India are exposed to many health hazards-	
	1. Wood Dust - Causes irritation to eyes, nose and throat.	
	2. Formaldehyde and Resin in Ply-boards – May cause respiratory problems including asthma.	
	Both the above are carcinogenic and workers should be informed properly about the health hazards. Safety trainings and drills should be conducted regularly.	
	3. Workers who breathe in wood particles generated by sanding and cutting may experience allergic respiratory symptoms.	
	4. Airborne dust can cause an explosion – any wood furniture manufacturing facility must install adequate dust extraction equipment and mandate cleaning procedures.	
	(Explain any two)	

Answer any 2 out of the given 3 questions in 30– 50 words each (3 x 2 = 6 marks)

Q. 17	Elaborate the five phases of Design Thinking.	3
	Answer: The Design Thinking process can be broken down into five steps of phases:	

1. EMPATHISE: the first stage of the process is spent getting to know the user and understand the wants, needs and objectives. This means observing and engaging with people in order to understand them on a psychological and emotional level. During this phase, the designer seeks to set aside the assumptions and gather real insights about the user.
2. DESIGN: This stage is dedicated to defining the problem. It is about gathering all the findings from the empathise stage and starting to make sense of them. By the end of the define phase, the designer will have a clear problem statement. The key here is to frame the problem in a user centred way.
   Once the designer formulates the problem into words, they can start to come up with solutions and ideas.
3. IDEATE: The third phase in the design thinking process is where creativity happens, and it's crucial to point out that the ideation stage is a judgement-free zone. Designers will hold ideation sessions in order to come up with as many new angles and ideas as possible.
   Brainstorming and mind-mapping are few of the techniques used.
   Towards the end of the ideation phase, the designer will narrow it down to a few ideas with which to move forward.
4. PROTOTYPE: The fourth step in the design thinking process is all about experimentation and turning ideas into tangible products. This is step is key in putting each solution to the test and highlighting any constraints and flaws. Throughout the prototype stage, the proposed solutions may be accepted, improved, redesigned or rejected depending upon how they fare in the prototype form.
5. TEST: After prototyping comes the user testing, but it is important to know that it is rarely the end of the design thinking process. In reality, the results of the testing phase will often lead the designer back to a previous step, providing the insights you need to redefine the original problem statement or to come up with new ideas he/she hadn't thought of before.

Q. 18	Explain the three basic motions of a loom.	3
	Answer: In order to achieve the technique of fabric manufacturing as described above briefly, the working of a loom has been divided into three basic motions:-	

(i) Shedding: This is the operation that helps in opening up the warp sheet creating the gaps through which the weft yarns will pass. In order to do this operation, primitive looms had the wooden shafts that were lifted by hand or by leg-driven pedals, as in handlooms. In power looms, this is done with the help of electricity, and the shafts were cam-driven initially. But this hampered the loom productivity as well as the design size was limited. So, later on, developments have evolved the dobby and then the jacquard mechanisms for shedding. In dobby, the design size is larger, giving the weaver or designer an increased scope for design exploration. The productivity is also higher. In jacquard, the design size is virtually unlimited and productivity even higher. But

jacquard designs are more complicated to be set up on a loom and hence, dobby looms are preferred in most cases, owing to comparative simplicity and lesser cost.

(ii) **Picking:** This is the operation in which the weft or the pick, also referred as the fill, passes through the open warp sheet. There are various methods of carrying the weft across the full width of the loom. In the most primitive way, a shuttle was used, which a wooden missile-like structure with a weft pirn would carry the weft yarn inside it. The shuttle was mechanically thrown from one side to the other. Low productivity and associated health hazards caused it to be replaced with other improved devices like the projectile, the rapier, the air-jet and the water-jet looms.

(iii) **Beat-up:** This is a very important operation of the loom. After shedding and picking, the beat-up action is to ensure that the newly introduced weft is closely packed in the body of the fabric, and hence, a mechanical force or thrust is exerted on the new weft by a device called the reed to embed it into the main fabric already woven, closely with the prior weft yarns.
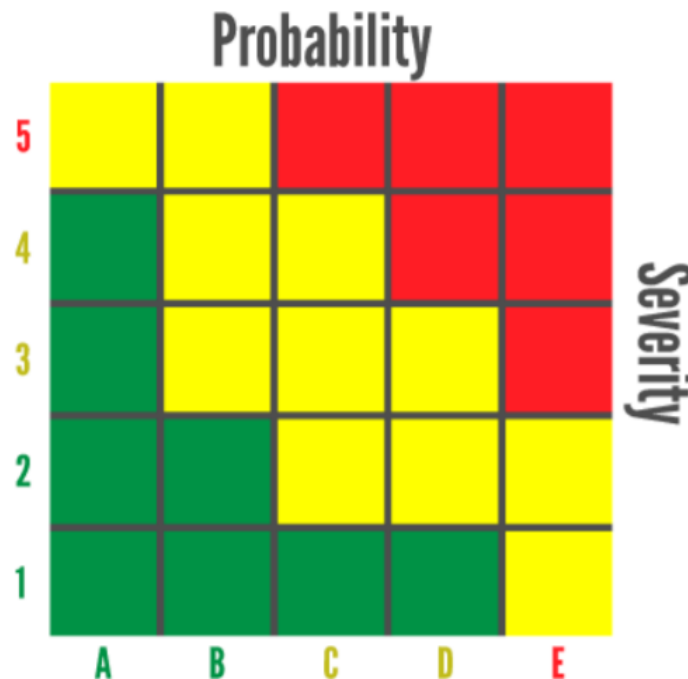
| Q. 19 | What is risk matrix grid? What does it represent? | 3 |

Answer: The risk matrix is broken into a grid. The grid is usually 5x5, though it can be larger or smaller depending on company needs – a 5x5 grid happens to be the ICAO default risk matrix. The grid is used to assign a calculated —"number" to the risk, which is combination of Probability x Severity, and represents the risk priority.
Probability: It is how lightly the event has to occur
Severity: It is the extent to which a particular risk can create an impact.

The risk matrix grid:
• Usually increases in severity from left (low) to right (high);
• Usually increases in probability from bottom (low) to top (high); but

	• A risk matrix can move in any direction, so it is common to see risk matrices that move from right to left and top to bottom, right to left and bottom to top, or left to right and top to bottom.	

Answer any 3 out of the given 5 questions in 50– 80 words each (4 x 3 = 12 marks)

| Q. 20 | What do you mean by Product Design? What are the essential requirements of a good product design?
Answer: Product design definition-
Designing a new product goes through an analytical process and relies on a problem-solving approach to improve the quality of life of the end user and his or her interaction with the environment. It is about problem-solving, about visualizing the needs of the user and bringing a solution.

Product designers also work with other professionals such as engineers and marketers. While not in charge of designing the purely mechanical and technological aspects of the product, they are however concerned with usability.

Product design has many fields of application: medical devices, tableware, jewelry, sports and leisure, food preservation appliances, furniture, etc.

It takes into consideration also the production cost, the manufacturing processes and the regulations.

Essential requirement of a good product design-
• Function: The product must be designed in such a way that it optimally performs the main task or function for which it is purchased by a buyer.
• Reparability
• Reliability
• Aesthetics
• Durability
•Producability
• Simplicity
• Compact | 4 |
| Q. 21 | Elaborate the six research tools for the empathize phase.
Answer: There are various methods and tools suggested by scholars and practitioners, few of them useful for design and user research are explained below:
1. User Interviews
2. Focus Group
3. Card Sorting
4. Ethnography – Contextual Enquiry
5. Shadowing
6. Survey
User Interview
The interview process is one of the most common and powerful ways to understand people. It can be considered the foundation for many of the methods designers use. The interview is a method for discovering facts and opinions held by potential users of the system being designed. | 4 |

The predominant form of interviewing is face-to-face and one-to-one. The interview can be organized around a set of structured questions, follow a more open format through semi structured questions or be unstructured with no prior questions.

It is important to prepare oneself much prior to the actual interview sessions. To be ready with a right questioner, which can help get the best insight about them.

Focus Group
A focus group is a moderated discussion that typically involves 5 to 10 participants and chaired by an impartial moderator. Its aim is to solicit focused feedback on specific issues or design ideas, giving designers first-hand experience of user reaction. Through a focus group, one can learn about user's attitudes, beliefs, desires, and reactions to concepts. Focus groups are a traditional market research technique. In a typical focus group, participants talk. During the focus group users tell about their experiences or expectations but the moderator doesn't get to verify or observe these experiences.

Card Sorting
Card sorting is a research method used to understand the way that the intended users of a website naturally organize or think about different types of information or content. It's also a method service teams can use to sort and arrange. Card Sorting can be conducted in a variety of circumstances using various means – one-on-one, during workshops, by mail, or electronically.

Card sorting is very popular among researchers as this is an easy way to get user input and validation very early on in a project without requiring a lot of initial preparation. It is the simple technique that's easy for participants and clients to understand. It's relatively inexpensive and easily demonstrates its value. Online card sorting lets you reach many participants, in diverse locations, in a very short period of time.

Ethnographic Research
Ethnography is a social research technique based on studying people's behavior in everyday contexts, rather than under controlled conditions (such as a conference room in a focus group testing center). Ethnographic techniques focus on informal conversation and observing the subjects in their environments, instead of on questionnaires or set lists of topics. This approach will allow you to be efficient while unearthing the true attitudes and behaviors of users, as opposed to merely gathering statistics.

In design research, the ethnographic approaches to participant interaction clarify complex human needs, behaviors, and perspectives. Field immersions unearth contextual and environmental factors that shape user experience. Rigorous, old-fashioned desk research and expert consultation support the fieldwork. It is important to know that a good design research doesn't always end with good data.

Contextual Enquiries
In a contextual enquiry, one watches and listens as the user works. They don't usually give the user tasks or scenarios. To understand what a user is doing or

thinking they ask questions as the user navigates the site. The results are usually qualitative, observed data, rather than quantitative, measured data.

Shadowing

Shadowing is observing people in context. It is important that the people one is observing are not aware of the same since that might lead to change in their natural behavior. It allows the researcher and designer to develop design insights through observation and shared experience with users.

Survey

Surveys, which are also called questionnaires, are one of the key ways to gather quantitative data for analysis. Surveys rely on asking the same question in the same way to a large number of people, and obtaining a lot of responses. These responses are then analyzed using statistical techniques to obtain information that can be generalized about the whole population.

Q. 22	Explain four types of wood working.	4
	Answer:	

HAND TOOL WOODWORKING Hand tool woodworkers choose to use classical tools and methods to build things. Hand saws, chisels, scrapers and planes are preferred over anything that plugs into a wall. Getting started can be very inexpensive. Hand tool woodworkers probably feel more of a connection to the process than any other type of woodworker. It takes patience, has a longer learning curve, it's a slower way to build and a lot quieter. But the personal fulfillment and satisfaction can be enormous.

POWER TOOL WOODWORKING - 90% of woodworkers today are power tool woodworkers. Power tools such as miter saws, table saws, drills, sanders are ubiquitous and can be a very affordable way to start building projects right away. Cutting a board on a table saw doesn't take anywhere near the skill and finesse of using a handsaw and takes a fraction of the time. They have the potential to cause serious injuries so awareness about the safety procedures is a necessity.

DIGITAL WOODWORKING The primary tool here is the CNC machine that makes precision cuts on flat pieces of wood using a router. One needs to layout and design all of the work on a computer and the machine will take care of the rest, cutting out all the pieces. The laser cutter or engraver allows to make even more precise cuts than a CNC and create some beautiful art. The biggest drawbacks to using digital machines are their cost. They have their limitations and one will probably still want a table saw and other power tools.

BLENDED WOODWORKING It is a mixture of hand tools and power tools. For instance blended approach to woodworking might make most cuts using a table saw, but use a chisel to hand cut dovetails. Some people find that hand tools offer greater precision and control for cutting technically demanding joints and enjoy improving their skills at these tasks.

SPECIALTY WOODWORKING There are two types of woodworking that some enthusiasts specialize in - Woodturning and scrolling:
Woodturning involves using a lathe to create bowls, spindles and other rounded

projects. It's kind of like sculpting clay on a potter's wheel, only with wood and chisels. The only real downside to getting into woodturning is that lathes can be pretty expensive.

Scrolling involves using a scroll saw which is capable of cutting extremely tiny curves and intricate patterns. It takes practice to become proficient, but it's relaxing and one can create some stunning art with a scroll saw. Unlike a lathe, scroll saws are relatively inexpensive. They are pretty quiet and don't make a huge mess. One can certainly find uses for both tools in a standard woodworking shop, maybe needing to make occasional table legs or add some decorative scrollwork to a fancy bookcase, but in general they aren't tools that are used that often.

(Explain any four)

Q. 23	Explain major forest based industries.
	Answer: The following are the major industries which depend heavily on forest and agroforestry plantation to meet the raw material requirement.
	
	1. Pulp and Paper Industries: The pulp and paper industry is one of the key industries in India and it is highly fragmented. Today, there are about 700 paper mills in India with 33 in the large scale sector. During 1990s, the per capita consumption of paper was 3.3 kg which has now escalated to 8 kg, but still lower compared to the global average of 47.7 kg. The current production of raw material for pulp and paper production is 2.76 million tons as against the demand of 5.04 million tons. The shortfall is as high as 45 per cent.
	
	2. Match Industries: Match wood industry is one of the oldest wood based industries in India. About 75 per cent of the total match wood industries in the country are located in the state of Tamil Nadu which comprises nearly 6,000 match industries with mechanized, semi mechanized and as cottage industry. The per capita consumption of matches in India increased steadily from 2.45 kg (1970) to 4.25 kg (1987).
	
	3. Timber and Sawn Wood Industries: Traditionally people in the country predominantly use timber and other converted wood in all their domestic and industrial wood requirement. The rapid population growth, urbanization and industrialization resulted in greater usage of wood in furniture, housing and construction material. During 2010-2012 more than 500 million square feet of space was estimated to be built in urban areas of the country and the wood products were valued around US Dollar 3 billion. With greater usage wood as a predominant material for housing and construction material in urban and semi urban areas there is going to be a great demand for timber and other sawn wood requirement. The Indian furniture market is estimated at 8 billion US Dollar and in most cases raw materials are imported from various countries.
	
	Major Timber Species:
	    i. Tectonagrandis
	    ii. Terminaliaspp
	    iii. Albizia spp.
	    iv. Gmelinaarborea
	    v. Azadirachtaindica
		4

vi. Pterocarpus spp.
vii. Mangiferaindica

4. Plywood Industries: One of the fastest growing in India is the plywood industry. The industrialization and urbanization and the increased interest on interior decorations have made great usage of plywood in the country. Wide range of species have been found amenable for making face, core and inner veneers resulted in establishment of more than 2,000 small scale industries involved in plywood manufacture. The liberalization and privatization policy of government of India also significantly contributed towards establishment of new rural industries. These industries also depend heavily on various species which thereby attracted large scale promotion of plywood based industrial wood plantations.

Major Plywood Species:
i. Populus spp.
ii. Meliadubia
iii. Paulownia spp.

5. Particle Board Industries: Particle board is reconstituted constructional panel particularly developed as a substitute for natural constructional wood and is made from low grade waste woods or from ligneous agricultural residues. These particle boards are predominantly used for wall paneling and interior decorations in domestic and industrial wood sector. In India, the first particle board industry was set up in late 1950s at Sitapur in Uttar Pradesh and from then onwards large number of industries has been installed across the country.

Major Raw Materials:
i. All types of wood waste
ii. All types of pine needles
iii. All types of Casuarina needles
iv. Ligneous agriculture residues

6. Fibre Board Industries: Fibre board is constituted using sheet materials of widely varying diversities manufactured from refined or partially refined wood fibers or other vegetable fibers.

7. Dendro Biomass Power Generation Industries: Biomass is an important fuel source in overall energy scenario. Biomass is produced through chemical storage of solar energy in plants and other organic matter as a result of photosynthesis. This biomass include plantation that produces energy crops, natural vegetable growth and other organic waste and residues. Among all these biomass, the role of dendro biomass is very significant due to their higher calorific value and increased fuel efficiency. Hence, large number of dendro biomass based power plants has been established across the country to generate electricity.

8. Value Addition Industries: The wood based industries have to store the harvested raw materials during rainy season in order to have sustainable raw material availability and to sustain the industrial process during lean season. The post-harvest management of huge volume of industrial wood necessitates proper handling, storage and utilization which demand a scientific intervention in order to

	reduce post-harvest losses due to biological agents particularly powder post beetles and pin hole borers.	
	These biological agents are taking a heavy toll on stored industrial raw materials which need to be addressed. Hence large number wood seasoning and preservative industries have been established to avoid post-harvest losses. Similarly, the plantation and industrial processing activities accounts for 20-30 per cent of wood residues which are either unutilized or underutilized for want of suitable recycling technologies.	
	These plantation and industrial wood residues have been successfully value added into briquettes and as on today many industries have been established across the country and successful value addition using plantation residues have been evidenced. These value added briquettes acted as excellent feed stock for biomass power generation industry, boiler industries and other industries requiring biomass for meeting the energy demands.	
Q. 24	Mention the common cause of injury and illness in the Iron and Steel Industry. **Answer:** Below are the most common causes of injury and illness in the iron and steel industry: (i) slips, trips and falls on the same level (ii) falls from height (iii) unguarded machinery (iv) falling objects (v) engulfment (vi) working in confined spaces (vii) moving machinery, on-site transport, forklifts and cranes (viii) exposure to controlled and uncontrolled energy sources (ix) exposure to asbestos (x) exposure to mineral wools and fibres (xi) inhalable agents (gases, vapours, dusts and fumes) (xii) skin contact with chemicals (irritants (acids, alkalis), solvents and sensitizers) (xiii) contact with hot metal (xiv) fire and explosion (xv) extreme temperatures (xvi) radiation (non-ionizing, ionizing) (xvii) noise and vibration (xviii) electrical burns and electric shock (xix) manual handling and repetitive work (xx) exposure to pathogens (e.g. legionella) (xxi) failures due to automation (xxii) ergonomics (xxiii) lack of OSH training (xxiv) poor work organization (xxv) inadequate accident prevention and inspection (xxvi) inadequate emergency first-aid and rescue facilities (xxvii) lack of medical facilities and social protection	4