Department of Industrial and Systems Engineering

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**Sub: Work System Design (IM20202, IM21008)**

**Answer all questions.** **Answers should be brief and to the point.**

Time 30 minutes Quiz -2 Each Question carries 2 marks

**Section-I**  **MSQ**

1. Main reason of introduction of automation in the cast house of Blast Furnace of 5MT integrated plant.
   1. Safety reasons
   2. reduce man power
   3. Improve productivity
2. Ergonomics is important in the worker -machine system. When
   1. only machines are present
   2. only workers are present
   3. When machines and workers are present
3. Linfox Logistics Limited has improved the productivity by
   1. Fit vehicles
   2. Scheduled rest to drivers
   3. Using GPS
   4. Running vehicles at high speed
4. CNC machines productivity is measured by
   1. Spindle running time
   2. Chips removal rate
   3. Down time
   4. setting time
5. A repetitive task should have
   1. Relatively short duration (usually a few minutes or less)
   2. High degree of similarity from one cycle to the next
   3. Takes a long time
   4. Work cycles are not similar
6. A Non-repetitive task should have
   1. Relatively short duration (usually a few minutes or less)
   2. High degree of similarity from one cycle to the next
   3. Takes a long time
   4. Work cycles are not similar
7. Two very common measures used to measure workers performance in industry are
   1. Standard hours
   2. Worker efficiency
   3. Performance evaluation
   4. Job rotation
   5. Over tasking
8. Principal factors that affect work load include
   1. Worker efficiency
   2. Defect rate
   3. Learning curve phenomenon
   4. Pollution
9. Six sigma is a very popular tool, used for quality improvement. It had been introduced by\_\_\_\_\_\_\_\_\_ and; it works on \_\_\_\_\_\_\_\_\_\_\_\_\_\_principle.
   1. Toyota, Lean
   2. Toyota, DMIAC
   3. Motorola, lean
   4. Motorola, DMAIC
10. TPS is a very popular concept in the industry now days. It was introduced by\_\_\_\_\_\_\_\_\_\_\_\_ and; it works on the principle of
    1. Toyota, Lean
    2. Toyota, DMIAC
    3. Motorola, lean
    4. Motorola, DMAIC
11. Percentage yield difference between 6-sigma level and 1-sigma level production system is approximately\_\_\_\_\_\_\_\_\_\_
    1. 99.99966
    2. 99.977
    3. 30.85
    4. 69.14966
    5. 84.13
12. The normal time for a repetitive task that produces two work units per cycle is 3.0 min. the plant uses a PDF allowances factor of 15%. Determine the standard time per piece.
    1. 2.45
    2. 4.45
    3. 3.45
    4. 4.45
    5. 5.55
13. The normal time for a repetitive task that produces two work units per cycle is 3.0 min. the plant uses a PDF allowances factor of 15%. Determine (a) how many work units are produced in an 8-hour shift at standard performance.
    1. 129
    2. 119
    3. 149
    4. 139
    5. 130
14. The normal time to perform the regular work cycle is 3.23 min. in addition, an irregular work element with a normal time 1.25 min is performed every 5 cycles. Determine the anticipated amount of time (in hours.) lost per 8-hour shift when an allowance factor of 15% is used.
    1. 2.34
    2. 1.32
    3. 0.35
    4. 2.045
    5. 1.044
15. Irregular work elements are
    1. Elements that are performed with a frequency of less than once per cycle
    2. Elements that are performed with a frequency of more than once per cycle
    3. Irregular elements are prorated into the regular cycle according to their frequency
    4. Irregular elements are not prorated into the regular cycle according to their frequency
16. Allowance given to manage Equipment breakdowns comes under
    1. Personnel allowance
    2. Fatigue allowance
    3. Delay allowance
    4. All correct
17. Once the method has been standardized, the actual time to perform the task is a variable because of:
    1. Differences in worker performance
    2. Variations in hand and body motions
    3. Blunders and bungles by worker
    4. Variations in starting work units
18. Office worker writing with a pen is an example of
    1. Manual work with hand tool
    2. Pure manual work
    3. Both possible
    4. Insufficient information
19. Assembly worker snap-fitting two parts together is an example of
    1. Manual work with hand tool
    2. Pure manual work
    3. Both possible
    4. Insufficient information
20. ATC extends for?
    1. Automatic tailor machine
    2. Automatic tool machine
    3. Automatic tool compound
    4. Automatic tool changer

**Section II:**  **Subjective**  **(Each question carries 2 marks)**

**Define the following term -**

1. (a) Work unit (b) System
2. (a) Unit operations (b) Cycle time
3. (a) Normal performance (b) Standard performance
4. (a) Normal time (b) Standard time
5. (a) Automation (b) Level of automated systems
6. (a) Internal work element (b) External work element
7. What is the one best method principle?
8. What does PFD stand for? What is the purpose of the PFD allowance in determining the standard time for a task?
9. In terms of human participation, what are the three basic category of work system?
10. What is the general characteristic that is common to nearly all pure manual work?
11. What are the factors that make the worker’s efficiency equal to the worker’s performance level?
12. The work cycle in a worker-machine systems consists of (1) external manual work elements with a total normal time of 0.42 min. (2) a machine cycle with a machine time of 1.12 min and (3) internal manual elements with a total normal time of 1.04 min. Determine the standard time for the cycle, using a PDF allowance factor of 15% and machine allowance factor of 30%.
13. A total of 1000 units of a certain product must be completed by the end of the current week. It is now late Monday afternoon, so only four days (8-hour shifts) are left. The standard time for producing each unit of the product (all manual operations) is 11.65 min. How many workers will be required to complete this production order if it is assumed that worker efficiency will be 115%?
14. A worker is responsible for loading and unloading a production machine. The load/unload elements in the repetitive work cycle have a normal time of only 24 sec, and the machine cycle time is 2.83 min. one part is produced each cycle. Every sixth cycle, the operator must replace the total pans of parts, which takes 2.40min. (Normal time). For setting, the standard time, the PDF allowance factor is 15% and the machine allowance factor is 15%. Determine the standard time if irregular element is performed as an external element.
15. The CNC grinding section has a large number of machines devoted to grinding of shafts for the automotive industry. The machine cycle takes 3.6 min to grind the shaft. At the end of this cycle, an operator must be present to unload and load parts, which takes 40 sec. (a) determine how many grinding machines the worker can service if it takes 20 sec to walk between the machines and no machine idle time allowed. (b) What is the hourly production rate of this machine cluster?