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ESE 2020 : Prelims Exam
CLASSROOM TEST SERIES

GENERAL STUDIES & ENGG. APTITUDE

Test 9

Section A : Ethics and Values in Engineering Profession

Section B : Basics of Project Management

Section C : General Principles of Design, Drawing and Importance of Safety

1.	(d)	11.	(c)	21.	(d)	31.	(a)	41.	(c)
2.	(b)	12.	(c)	22.	(b)	32.	(a)	42.	(c)
3.	(d)	13.	(b)	23.	(d)	33.	(c)	43.	(b)
4.	(c)	14.	(b)	24.	(b)	34.	(c)	44.	(c)
5.	(c)	15.	(a)	25.	(c)	35.	(a)	45.	(b)
6.	(b)	16.	(c)	26.	(d)	36.	(d)	46.	(b)
7.	(c)	17.	(d)	27.	(a)	37.	(b)	47.	(c)
8.	(d)	18.	(c)	28.	(d)	38.	(c)	48.	(a)
9.	(a)	19.	(d)	29.	(c)	39.	(d)	49.	(a)
10.	(d)	20.	(c)	30.	(b)	40.	(b)	50.	(c)

DETAILED EXPLANATIONS

3. (d)

Factors that guide social responsibility of engineers are:

(i) Accountability
(ii) Transparency
(iii) Ethical behavior
(iv) Respect for law
(v) Respect for stakeholder's interests
(vi) Respect for human rights
(vii) Respect for international norms of behavior

5. (c)

Hierarchy with respect to ethical obligations of engineers:

(i) **Primary:** Ethical obligations to the public
(ii) **Secondary:** Ethical obligations to employer or client
(iii **Tertiary:** Ethical obligations to other professionals and parties

6. (b)

Service learning is a teaching method that enriches learning by engaging students which is meaningful to their school curriculum.

7. (c)

The characteristics which courageous engineers are expected to own and show in their profession are:

(i) Perseverance (sustained hard work)
(ii) Experimentation (preparedness to face the challenges, i.e. unexpected or unintended results)
(iii)Involvement (attitude, clear and firm resolve to act)
(iv)Commitment (willing to get into action and to reach the desired goals by any alternative but ethical means).

8. (d)

1st statement refers to negative/preventive ethics.
2nd statement refers to positive/aspirational ethics.

9. (a)

- There are two characteristics of whistleblowing: In internal whistleblowing, the alarm about wrongdoing stay within the organization, whereas in external whistleblowing the whistleblower alerts the regulatory organization or public.
- In whistleblowing, one reveals the information which he/she finds unethical or immoral.

10. (d)

The principle of non-maleficence tells what not to do. It is sometimes also referred as a negative injunction.

12. (c)
While designing a product or structure, engineers should take care of all environmental issues and impacts related to the project.

13. (b)
A code of ethics outlines the ethical principles that govern decisions and behavior at a company or organization (which improve the public image of the company as well). It gives general outlines of how employees should behave, as well as specific guidance for handling issues like harassment, safety, and conflicts of interest.

14. (b)
- Affective empathy refers to the sensations and feelings one gets in response to others' emotions.
- Cognitive empathy refers to our ability to identify and understand others' emotions.
- Emotional resonance is a compassion of feeling the others' pain.
- Sentient compassion refers to feeling of compassion towards any living being.

15. (a)
- Bootlegging refers to working on a project which are prohibited or not properly authorized.
- Grease payment is an offer to facilitate speedy clearance from customs and getting faster processing or permits.

21. (d)
Not reporting environmental issues is an example of lack of integrity.

23. (d)
- Institutional authority is the right given to the employees to exercise power, to complete the task and force them to achieve their goals.
- Expert authority is the possession of special knowledge, skills and competence to perform a job efficiently and effectively.

25. (c)
Engineers should not indulge in personal conflict of interest or have any personal interests while performing the professional duty.

26. (d)
Control system is an arrangement that offers the project manager with details about deviations of the project from what was planned and also recommends corrective actions needed for rectifying the deviations.

27. (a)
Cost variance is the difference between actual expenditure made in the project till the date of review to the value of work accomplished.
For the expenses incurred.

$$CV = \text{BCWP} - \text{ACWP}$$

28. (d)

PERT is event-oriented and adopts probabilistic approach where as CPM is activity-oriented and adopts deterministic approach.

30. (b)

$$\text{Variable cost} = \text{Rs. } 65000 - \text{Rs. } 25000 = \text{Rs. } 40000$$

$$\text{Variable cost per unit} = \frac{40000}{8000} = \text{Rs. } 5 \text{ per unit}$$

$$\text{Sales revenue per unit} = \frac{80000}{8000} = \text{Rs. } 10 \text{ per unit}$$

$$\text{BEP} = \frac{25000}{(10-5)} = 5000 \text{ units}$$

31. (a)

The term 'Term loan' denotes long term loans offered for project financing. The period of principal repayment of such long term loans vary from 5 to 10 years depending upon the nature of project. Initial moratorium (holiday period) for the repayment of principal of one to two years is normally provided.

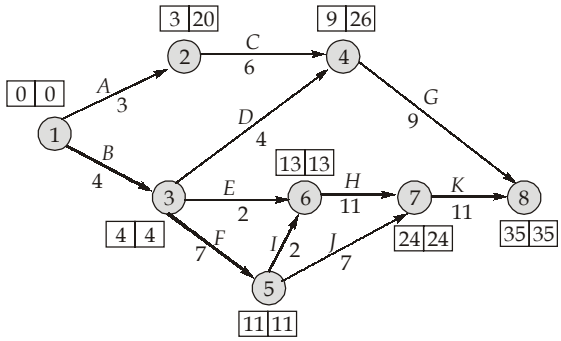
32. (a)

A critical path is a time wise longest path, it doesn't mean that the critical path will have the maximum number of activities.

33. (c)

Independent float of an activity does not disturb preceding activities and succeeding activities. If the float of an activity is entirely used up in that activity, that activity and all subsequent activity becomes critical.

34. (c)



35. (a)

Using discounted flow techniques.

$$PV_A = \frac{100000}{1.2^2} = \text{Rs. } 69444$$

$$PV_B = \frac{110000}{1.2^3} = \text{Rs. } 63657$$

Investment A will yield more return.

37. (b)

Controlling and monitoring is complementary to the planning process. Once the scheduled plan has been prepared and execution commenced, control over the progress has to be exercised in order to complete the project by the stipulated date.

38. (c)

Graphical Evaluation and Review Technique (GERT) is a technique for the analysis of networks which takes into account the probabilistic nature of occurrence of events. GERT takes into account the uncertainties that are inherent in real projects and arrives at the critical path duly incorporating the uncertainties.

GERT is not widely used for small/medium sized projects in view of the sophistication that it contains and the enormous computer resource that it demands for its application.

39. (d)

The basic concept of brainstorming is to generate a large quantity of ideas. Research shows that more the ideas, the higher the quality of the desired product.

A set of rules has been developed for brainstorming sessions:

1. No criticism of ideas during the session. One way to prevent the criticism is to disallow discussion during the session. Present the ideas in brief and short format. One of the participants in the group will need to collect all ideas or use a sticker for each idea.
2. Wild, silly, and crazy ideas are welcomed. Such ideas may help others generate solid ideas or help maintain a fun and humorous environment.
3. Generate as many ideas as possible. One way to do so is to appoint a facilitator who will keep rotating the turns without allowing break time. Keep a competitive spirit alive. Some people produce more when competing with others in a group.
4. Adding to or improving presented ideas is welcomed. This will help maintain a stream of ideas.

40. (b)

Failure Modes and Effect Analysis: This method was originally developed for use in the design and development of flight control systems. The method can also be used to evaluate design at the initial stage from the point of view of safety. Basically, the technique calls for listing the potential failure modes of each part, as well as the effects on the parts and on humans. The technique may be broken down into seven steps:

1. Defining system boundaries and requirements.
2. Listing all items.
3. Identifying each component and its associated failure modes.
4. Assigning an occurrence probability or failure rate to each failure mode.
5. Listing the effects of each failure mode on concerned items and people.
6. Entering remarks for each possible failure mode.
7. Reviewing and initiating appropriate corrective measures.

41. (c)

The morphological chart is a method to arrange all the functions and sub-functions in a logical order. The morphological chart also enlists the possible "how's for each sub-function with an aim to realize the combinations of ideas comprising several design concepts. Following is the typical procedure to develop a morphological chart.

- Establish the functions that the design product must perform
- List the functions, one per row, in a chart.
- For each function (row), list a wide range of sub-solutions, one per column.
- Select an acceptable set of sub-solutions, one for each function.

42. (c)

43. (b)

Preventing chemical burn injuries presents a special challenge to safety and health professionals. The following strategies are recommended:

- Familiarize yourself to the workers, and their supervisors with the chemicals that will be used and their inherent dangers.
- Secure the proper personal protection equipment for each type of chemical that will be used.
- Provide instruction on the proper use of personal protection equipment and then make sure that supervisors confirm that the equipment is used properly every time.
- Monitor that workers are wearing personal protection equipment and replace it when it begins to show wear.

44. (c)

- **Class A extinguisher:** For use on ordinary combustibles such as wood or paper. These extinguishers are normally water. They normally operate by changing water to steam, which has a cooling effect on the fires.
- **Class B extinguisher:** For use on flammable materials or combustible materials such as kerosene, gasoline, and grease.
- **Class C extinguisher**: For use on electrical fires. Utilizes a non-conducting extinguishing agent such as carbon dioxide or certain dry chemicals.
- **Class D extinguisher:** For use on combustible metals such as magnesium, titanium, sodium, potassium, and zirconium.

45. (b)

There are various forms of the systematic design process. Essentially though, they all revolve around the same following basic principles:

- Requirements
- Product concept
- Solution concept
- Embodiment design
- Detailed design

46. (b)
The development of the lateral surface of a pyramid consists of a number of isosceles triangles in contact.

47. (c)
When inclination of cutting plane with axis of right cone is more than inclination of generator with axis of right cone then curve produced due to intersection of cutting plane and curved surface of right cone is an ellipse.

49. (a)
If a cutting plane is parallel to a face of the tetrahedron, the section will be an equilateral triangle. An imaginary line joining the point of attachment of string to the centre of gravity (CG) of solid is always vertical.

50. (c)
A line parallel to both horizontal and vertical plane which lies in neither of them doesn't have any vertical trace or horizontal trace.

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