

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

T.B.C. : KJL-G-DST

Test Booklet Series

Serial No.

1230175 TEST BOOKLET



**GENERAL STUDIES AND
ENGINEERING APTITUDE**

Time Allowed : Two Hours

Maximum Marks : 200

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.
2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.
3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. *DO NOT* write anything else on the Test Booklet.
4. This Test Booklet contains 100 items (questions). Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose *ONLY ONE* response for each item.
5. You have to mark your responses *ONLY* on the separate Answer Sheet provided. See directions in the Answer Sheet.
6. All items carry equal marks.
7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.
8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator *only the Answer Sheet*. You are permitted to take away with you the Test Booklet.
9. Sheets for rough work are appended in the Test Booklet at the end.
10. **Penalty for wrong answers :**
THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE.
 - (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third (0.33)** of the marks assigned to that question will be deducted as penalty.
 - (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.
 - (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

1. Find the absolute maximum and minimum values of

$$f(x, y) = 2 + 2x + 2y - x^2 - y^2$$

on triangular plate in the first quadrant, bounded by the lines $x = 0$, $y = 0$ and $y = 9 - x$.

- (a) -4
(b) -2
(c) 4
(d) 2

2. For the matrix

$$A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$$

the expression

$$A^5 - 4A^4 - 7A^3 + 11A^2 - A - 10I$$

is equivalent to

- (a) $A^2 + A + 5I$
(b) $A + 5I$
(c) $A^2 + 5I$
(d) $A^2 + 2A + 6I$

3. The solution of the differential equation

$$(1 + y^2)dx = (\tan^{-1} y - x)dy$$

is

- (a) $x = \tan^{-1} y + 1 + ce^{-\tan^{-1} y}$
(b) $x = \tan^{-1} y - 1 + ce^{-\tan^{-1} y}$
(c) $x = \frac{1}{2} \tan^{-1} y - 1 + ce^{-\tan^{-1} y}$
(d) $x = \frac{1}{2} \tan^{-1} y + 1 + ce^{-\tan^{-1} y}$

4. The value of $\Delta^{10} [(1 - ax)(1 - bx^2)(1 - cx^3)(1 - dx^4)]$

is

- (a) $abcd (10!)$
(b) $abcd (9!)$
(c) $abcd (8!)$
(d) $abcd (7!)$

5. If $u = \log_e \left(\frac{x^4 + y^4}{x + y} \right)$, the value of

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$$

- (a) 6
(b) 5
(c) 4
(d) 3

6. The general value of $\log(1+i) + \log(1-i)$ is

- (a) $\log 2 - 4n\pi i$
(b) $\log 2 + 4n\pi i$
(c) $\log 2 + 2n\pi i$
(d) $\log 2 - 2n\pi i$

7. A bag contains 4 white and 2 black balls and another bag contains 3 of each colour. A bag is selected at random and a ball is drawn at random from the bag chosen. The probability of the white ball drawn is

- (a) $\frac{1}{3}$ (b) $\frac{1}{4}$
(c) $\frac{5}{12}$ (d) $\frac{7}{12}$



8. X is a continuous random variable with probability density function given by

$$\begin{aligned} f(x) &= kx & (0 \leq x < 2) \\ &= 2k & (2 \leq x < 4) \\ &= -kx + 6k & (4 \leq x < 6) \end{aligned}$$

The value of k will be

(a) $\frac{2}{3}$

(b) $\frac{1}{8}$

(c) 1

(d) 8

9. The first moment about origin of binomial distribution is

(a) np

(b) npq

(c) $n(1-p)$

(d) $n(1-p)q$

10. For the regression equations

$$y = 0.516x + 33.73$$

and

$$x = 0.512y + 32.52$$

the means of x and y are nearly

(a) 67.6 and 68.6

(b) 68.6 and 68.6

(c) 67.6 and 58.6

(d) 68.6 and 58.6

11. In a rectangular hyperbola, if a curve is traced out by a point moving in such a way that the product of its distances from two fixed lines at right angles to each other is a constant, then those fixed lines are called

(a) asymptotes

(b) intercepts

(c) holes

(d) limits

12. The line passing through the focus and perpendicular to the directrix is called

(a) axis

(b) vertex

(c) eccentricity

(d) conic

13. Dimensions in a series may be placed in any one of the following ways, **except**

(a) progressive dimensioning

(b) proportional dimensioning

(c) continuous dimensioning

(d) chain dimensioning

14. Among the effects of design specifications on costs, which one of the following is the most significant that influences the producibility of end product?

(a) Standard size

(b) Large tolerance

(c) Breakeven point

(d) Cost estimate

15. Which one of the following is **not** the best approach for the prevention of product liability?

- (a) Analysis and design
- (b) Quality control
- (c) Comprehensive testing
- (d) Cost

16. Which one of the following is **not** the way of estimating the statistical parameters and is integral part of analysis or synthesis tasks when probability of failure is involved?

- (a) Propagation of error
- (b) Propagation of uncertainty
- (c) Propagation of weight
- (d) Propagation of dispersion

17. In order to limit the seriousness of an accident, emergency controls should be provided with which of the following as determining factors in the location of emergency stops?

- (a) Speed and ease of operation
- (b) Common sense of workers
- (c) Nearest exits and checkpoints
- (d) Supervisors and decision-makers

18. Human engineering approach is followed to prevent accidents by giving due consideration to physical and mental limitations of the workers by

- (a) giving constant attention to how a worker is likely to react rather than how supervisor would like him to react
- (b) imposing too many safety rules
- (c) not permitting to make safety device or guard inoperative
- (d) giving first-aid attention in case of injury

19. Which one of the following is **not** an operator error through triggers leading to an accident which confuses and traps into making mistake?

- (a) Faulty design or construction of machine tool
- (b) Poor housekeeping and cleanliness
- (c) Standard operating safety practice
- (d) Lack of standardization and identification

20. Which one of the following is **not** included in the safety program for achieving good results during the prevention of accidents?

- (a) Development of safe working conditions
- (b) Promotion of employees participation in safety
- (c) Compensation and medical payment
- (d) Corrective action when safety rules are ignored

21. During an assessment of economic viability of the project, the ratio of average annual earnings after tax to the average book investment, after depreciation is called

- (a) Benefit-Cost Ratio (BCR)
- (b) Net Present Value (NPV)
- (c) Pay-Back Period (PBP)
- (d) Return on Investment (ROI)

22. Who is responsible for the following activities in a project?

1. Achieving a unity of control over project activities
2. Having an authority to control project matters and disburse funds from the budget
3. Having no actual line of authority over workers

- (a) Project Expeditor
- (b) Project Coordinator
- (c) Matrix Manager
- (d) Project Manager

23. The creative technique applied when the available and required inputs as well as the desired outputs are listed, is

- (a) attribute listing
- (b) direct dreaming
- (c) black box
- (d) Delphi

24. The market price per share of a company is ₹ 125. The dividend per share (DPS) expected a year is ₹ 12 and DPS is expected to grow at a constant rate of 8% per annum. The cost of the equity capital to the company will be

- (a) 17.6%
- (b) 15.4%
- (c) 13.2%
- (d) 11.8%

25. Which one of the following risks can be reduced by investing in projects or acquiring other firms that have a negative correlation with the earnings of the firm?

- (a) Investment risk
- (b) Business risk
- (c) Financial risk
- (d) Portfolio risk

26. An individual investor who invests in the e-project usually during an early stage is

- (a) corporate strategic investor
- (b) founder capital
- (c) angel investor
- (d) venture capital

27. If the nominal rate of interest is 12% and is compounded quarterly, the effective rate of interest per annum will be nearly

(a) 10.8%

(b) 12.6%

(c) 14.4%

(d) 16.2%

28. In a bank, deposits can be made for periods ranging from 6 months to 10 years. Every quarter, an interest will be added on to the principal. The rate of interest applied is 9% per annum for periods from 12 months to 23 months and 10% per annum for periods from 24 months to 120 months. An amount of ₹ 1,000 invested for 2 years to grow, will be nearly

(a) ₹ 1,218

(b) ₹ 1,334

(c) ₹ 1,414

(d) ₹ 1,538

29. A company has issued ₹ 20 million worth of non-convertible debentures, each at a face value of ₹ 100 at the rate of 12%. Each debenture is redeemable at a premium of 5%, after 10 years. If the net amount realized is ₹ 95 and tax rate is 40%, the cost per debenture will be

(a) 5.8%

(b) 6.6%

(c) 7.4%

(d) 8.2%

30. A cybernetic control system that acts to reduce deviations from standard is called

(a) a negative feedback loop

(b) a positive feedback loop

(c) a closed loop

(d) an open loop

31. In which one of the following types of bonds, the bond formation is by free moving electrons in an array of positive ions?

(a) Homopolar bond

(b) Electrostatic bond

(c) Metallic bond

(d) Covalent bond

32. If a pair of one cation and one anion is missing in an ionic crystal such that those pairs of ions are equal to maintain electrical neutrality, then that pair of vacant sites is called

(a) Schottky imperfection

(b) pair of vacancies

(c) Frenkel defect

(d) point imperfection

33. Which of the following are the characteristics of covalent compounds?

1. They are mostly gases and liquids.
2. They are usually electric insulators.
3. They are directional in nature.
4. They are insoluble in polar solvents like water but are soluble in non-polar solvents.

(a) 1, 2 and 3 only

(b) 1, 2 and 4 only

(c) 1, 3 and 4 only

(d) 1, 2, 3 and 4

34. The photoelectric current depends on which of the following factors?

1. The frequency of the incident light
2. The intensity of the incident light
3. The potential difference between the electrodes
4. The photosensitivity of the non-metal

(a) 1, 2 and 4

(b) 1, 2 and 3

(c) 1, 3 and 4

(d) 2, 3 and 4

35. Which one of the following statements is correct regarding ductile fracture?

(a) Fractured surfaces are crystalline in appearance.

(b) There is virtually no reduction in cross-sectional area during fracture.

(c) Fracture takes place after necking with little sound.

(d) Percentage elongation is about 60% prior to fracture occurs.

36. Which of the following factors are affecting critical shear stresses?

1. Purity of metals reduces the critical shear stress

2. Surface films greatly enhance the critical shear stress

3. Rise in temperature

4. Rate of deformation and the extent of initial deformation also help in raising the critical shear stress

(a) 1, 2 and 3 only

(b) 1, 2 and 4 only

(c) 1, 3 and 4 only

(d) 1, 2, 3 and 4

37. Which one of the following types of materials is having high remanence, coercivity and saturation flux density as well as low permeability and high hysteresis energy losses?

(a) Soft magnetic materials

(b) Hard magnetic materials

(c) Hard electrical materials

(d) Soft electrical materials

38. Polymers having strong primary bonds throughout, often formed by condensation polymerization, and their structure resembles one large molecule, are known as

- (a) thermoplastic polymers
- (b) thermosoftening polymers
- (c) thermosetting polymers
- (d) random polymers

39. An FET is a semiconductor device with the output current controlled by an electric field and its current is carried predominantly by one type of carriers. It is known as

- (a) junction transistor
- (b) unipolar transistor
- (c) MOSFET
- (d) IGBT

40. Which one of the following is the trade name of polycarbonates?

- (a) Alathon
- (b) Baylon
- (c) Bexphane
- (d) Cycolac

41. Which one of the following is **not** a Creative Commons license which users can choose to apply when publishing their work?

- (a) Attribution
- (b) Share-Alike
- (c) Copyright Infringement
- (d) No Derivative Works

42. The Ethernet designed by IEEE to compete with LAN protocols which can transmit data ten times faster at a rate of 100 Mbps is

- (a) fast Ethernet
- (b) bridged Ethernet
- (c) switched Ethernet
- (d) full-duplex Ethernet

43. IEEE standard protocol which defines a wireless Personal Area Network (PAN) operable in a room is

- (a) Wi-Fi
- (b) Bluetooth
- (c) Infrared
- (d) Wireless LAN

Which one of the following points is a private switching station that connects the national internet service provider's network and operates at a high data rate up to 600 Mbps?

- (a) Locking point
- (b) Peering point
- (c) Hub point
- (d) Modem point

45. Which one of the following is the nodal department to implement public internet access program and rural internet connectivity by converting its offices as multi-service centres?

- (a) Department of Electronics and Information Technology
- (b) Department of Information and Broadcasting
- (c) Department of Telecommunication
- (d) Department of Posts

46. Which one of the following is **not** the vision area of Digital India as a program to transform India into a digitally empowered society and knowledge economy?

- (a) Infrastructure as utility to every citizen
- (b) Governance and services on demand
- (c) Free Wi-Fi access
- (d) Digital empowerment of citizens

47. Infrastructure aspects provided by the Government of India in formation of National e-Governance Plan for storage of data and hosting applications, network connectivity and capacity building respectively are

- (a) SDC, SWAN and NISG
- (b) SWAN, SDC and NISG
- (c) SDC, NISG and SWAN
- (d) SWAN, NISG and SDC

48. Which one of the following is **not** the characteristic of Good Governance and e-Governance that are closely linked and depend on each other?

- (a) Accountable
- (b) Transparent
- (c) Consciousness
- (d) Consensus-oriented

49. Which one of the following is **not** the skill needed in the workplace of the future for inventive thinking using information and communication technology in education?

- (a) Adaptability
- (b) Responsibility
- (c) Curiosity and creativity
- (d) Risk-taking

50. The pedagogy which involves productive learning and finding new solutions to problems, where manipulation of existing information and creation of real-world products are possible with ICT, is called

- (a) collaborative pedagogy
- (b) creative pedagogy
- (c) integrative pedagogy
- (d) evaluative pedagogy

51. The basic difference between a professional and an amateur is

- (a) a professional is someone who is connected with a job that needs special training or skill, while an amateur is someone who works in multi-dimensions without any specialization
- (b) a professional is clear in thinking and focused on the job, while an amateur is confused and distracted from the job
- (c) a professional does high quality work/job in a specific area, while an amateur is associated with specific area with lowest pay
- (d) a professional remains positive and achieves despite facing grievances, while an amateur does work efficiently due to many imagined grievances

52. 'Euthanasia' refers to the

- (a) loyalty of the people that take pride in being part of their organization and care for the organization above their own well-being
- (b) ills in the society that are caused by ignorance and lack of respect for the laws of the land
- (c) emotional intelligence to understand how people perform various functions
- (d) killing of a terminally ill person suffering acutely with no hope of survival

53. 'Utilitarianism' in the professional ethics is

- (a) an acquired habit that helps to lead a rational life
- (b) a skill to solve a current ethical problem by comparing it with similar problems from the past and their outcome
- (c) a right of activists to decide their own duties
- (d) a judgment of an action by the consequences of that action

54. In the professional ethics, the degree of safety proposed to be attained varies with

- (a) design, duration and product
- (b) cost of risk, design and utility
- (c) cost of risk, perception and utility
- (d) product, perception and cost of risk involved

55. The basic ethical principle of 'Beneficence' states that

- (a) all our thoughts and actions must be directed to ensure that others benefit from these thoughts and actions
- (b) our actions must result in the least harm to the others
- (c) we should not impose our views on others
- (d) our actions must be fair to everyone

56. Which of the following are the main functions of WTO?

1. To organize meetings of member countries to arrive at trade agreements covering international trade
2. To ensure that member countries conduct trade practices as per agreements agreed upon and signed by the member countries
3. To provide a platform to negotiate and settle disputes related to international trade between and among member countries

- (a) 1 and 2 only
- (b) 1 and 3 only
- (c) 2 and 3 only
- (d) 1, 2 and 3

Directions :

Each of the next four (4) items consists of two statements, one labelled as 'Statement (I)' and the other as 'Statement (II)'. You are to examine these two statements carefully and select the answers to these items using the code given below :

Code :

- (a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
- (b) Both Statement (I) and Statement (II) are individually true but Statement (II) is **not** the correct explanation of Statement (I)
- (c) Statement (I) is true but Statement (II) is false
- (d) Statement (I) is false but Statement (II) is true

57. Statement (I) :

If the project influence is more in decision-making for the project, then the arrangement is considered a strong matrix.

Statement (II) :

If functional departments are seen to be influencing the decision-making more, the arrangement is considered a weak matrix.

58. Statement (I) :

Raw materials are taken as traded items and their values at domestic and world prices are estimated.

Statement (II) :

Raw materials, which have a high value-to-volume ratio and involve proportionately high transport cost and are imported, are regarded as non-traded items.

59. Statement (I) :

Information and Communication Technologies (ICTs) can facilitate improved service delivery and more efficient internal operations.

Statement (II) :

ICTs can create new opportunities for the marginalized and the vulnerable of society but do not represent a panacea for all development problems.

60. Statement (I) :

Long-term sustainability of e-Governance projects does not depend on financial viability, especially if they are to be implemented in the Public-Private Partnership (PPP) mode.

Statement (II) :

Front-end e-services are possible without back-end computerization.

61. What is TADF?

- (a) Technology Acquired Desired Firm
- (b) Technologically Advanced Direct Fund
- (c) Technologically Accomplished Direct Fund
- (d) Technology Acquisition and Development Fund

62. Technical textiles are

- (a) the high-tenacity fibres which are lightest and toughest fabrics mainly used in automobile and aerospace industries
- (b) the toughest fabrics which are much heavier than polyester and used in power industries
- (c) the toughest fabrics having rigidity mainly used in polyhouse construction
- (d) the high-tenacity fabrics having fire resistance property

63. Which one of the following is a measure of sustainable income level that can be secured without decreasing the stock of natural assets?

- (a) Natural Capital Stock
- (b) Environmental Value
- (c) Green Accounting
- (d) Social Discount Rate

64. Which one of the following is a resource allocation as per Chenery's development process?

- (a) Investment
- (b) Structure of domestic demand
- (c) Labour allocation
- (d) Government revenue

65. Which one of the following ratios is referred to as everything that has been invested in the past and to the whole income?

- (a) Capital-output ratio
- (b) Average capital-output ratio
- (c) Incremental capital-output ratio
- (d) Marginal ratio

66. Which one of the following methods of planning is an attempt to work out the implications of the development effort in terms of factor allocations and product yields so as to maximize income and employment?

- (a) Perspective planning
- (b) Physical planning
- (c) Financial planning
- (d) Indicative planning

67. Which one of the following reflects an intrinsic or true value for factors or products?

- (a) Price inflation
- (b) Economy pricing
- (c) Penetration pricing
- (d) Shadow price

68. Which one of the following control policies leaves no freedom to private enterprise to buy plant, machinery, raw materials from the country of its choice?

- (a) Import control
- (b) Export control
- (c) Exchange control
- (d) Physical control

69. Which one of the following is a particular form of collusive price-fixing behaviour by which firms coordinate their bids on procurement or project contracts?

- (a) Predatory pricing
- (b) Horizontal price-fixing (collusion)
- (c) Bid rigging
- (d) Exclusive territory

70. Which one of the following is an example of horizontal practice of firm?

- (a) Refusal to deal
- (b) Retail price maintenance
- (c) Predatory pricing
- (d) Exclusive territory

71. Ten years ago father was 12 times as old as his son and after 10 years father will be 2 times older than his son. The present ages of father and son respectively are

- (a) 32 years and 14 years
- (b) 34 years and 14 years
- (c) 32 years and 12 years
- (d) 34 years and 12 years

72. A number of friends decided to go on a picnic and planned to spend ₹ 96 on eatables. Four of them, however, did not turn up. As a consequence, the remaining ones had to contribute ₹ 4 each extra. The number of those friends who attended the picnic is

- (a) 8
- (b) 12
- (c) 16
- (d) 20

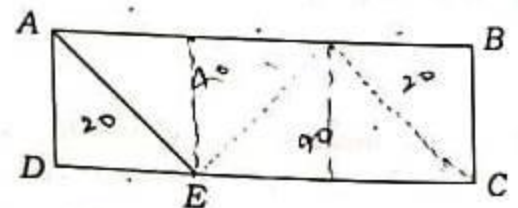
73. Consider the following gold articles P, Q, R, S and T with different weights :

- P weighs twice as much as Q
- Q weighs four and a half times as much as R
- R weighs half as much as S
- S weighs half as much as T
- T weighs less than P but more than R

Article T will be lighter in weight than

- (a) P and S
- (b) P and R
- (c) P and Q
- (d) Q and R

74. Consider the rectangle ABCD with $DE = \frac{1}{3}DC$ in the figure :



When the area of the triangle ADE is 20 cm^2 , the area of the rectangle ABCD will be

- (a) 60 cm^2
- (b) 80 cm^2
- (c) 100 cm^2
- (d) 120 cm^2

75. Four metal rods of lengths 78 cm, 104 cm, 117 cm and 169 cm are to be cut into parts of equal length. Each part must be as long as possible. The maximum number of pieces that can be cut will be

- (a) 27
- ✓ (b) 36
- (c) 43
- (d) 52

76. A man walked 3 km towards East, then 5 km towards North-East, then 8 km towards South and finally 5 km towards North-East direction. The distance of his present location from the starting point will be

- (a) 9 km
- (b) 11 km
- (c) 15 km
- (d) 21 km

77. A clock strikes once at 1 o'clock, twice at 2 o'clock, thrice at 3 o'clock and so on. The number of times it strikes in 24 hours will be

- (a) 116
- (b) 136
- (c) 156
- (d) 196

78. The sum of all the natural numbers between 1 and 101 which are divisible by 5 is

- (a) 1000
- (b) 1050
- (c) 1500
- (d) 2550

79. In a group of 1000 people, 750 speak Hindi and 400 speak English. The number of only Hindi speaking people is

- (a) 150
- (b) 350
- (c) 600
- (d) 750

80. Consider the following students in an examination :

- A scored more than B
- C scored as much as D
- E scored less than F
- B scored more than C
- F scored less than D

Who scored the lowest?

- (a) E
- (b) C
- (c) D
- (d) F

A > B

A > B > C > D >

E < F

81. Which of the following departments ensure the quality of the product?

1. Product design and development
2. Marketing and product planning
3. Packaging and shipping
4. Sales

- (a) 1, 2 and 3
 (b) 1, 2 and 4
 (c) 1, 3 and 4
 (d) 2, 3 and 4

82. Which of the following are the general subareas of quality control?

1. Off-line quality control
2. Sales/market share
3. Statistical process control
4. Acceptance sampling plans

- (a) 1, 2 and 3
 (b) 1, 3 and 4
 (c) 1, 2 and 4
 (d) 2, 3 and 4

83. Which of the following steps come under 14-step plan for quality improvement?

1. Ad hoc committee for the zero defects program
2. Cost of quality evaluation
3. Quantity measurements
4. Supervisor training

- (a) 1, 2 and 3
 (b) 1, 2 and 4
 (c) 1, 3 and 4
 (d) 2, 3 and 4

84. An Average Outgoing Quality (AOQ) is

(a) $\frac{P_a p(N)}{N - n}$

(b) $\frac{P_a p(N + n)}{N}$

(c) $\frac{P_a p(N - n)}{n - N}$

(d) $\frac{P_a p(N - n)}{N}$

where

P_a = Probability of accepting the lot

p = Incoming lot quality

N = Lot size

n = Sample size

85. Which one of the following is the measure of service quality that correlates with the human factors and behavioural characteristics of service quality?

(a) Number of complementary responses based on human traits in delivery of service

(b) Proportion of income tax returns prepared by an agency that have errors

(c) Shabby appearance of a receptionist in a bank or hotel

(d) Inadequate temperature control in a convention meeting room

86. Which of the following factors affect the quality of conformance in construction?

1. Site construction methods
2. Technical specifications
3. Engineering and design process
4. Supervision and control

(a) 1 and 3

(b) 2 and 3

(c) 2 and 4

(d) 1 and 4

87. Which of the following considerations are important during inspection of the work in prestressed concrete works?

1. Sheathings are threaded properly including correct threading of couplers and taping of joints
2. Only approved sheathings, HTS strands, anchor heads and wedges are to be used
3. Splicing of reinforcement to be provided at the joints

(a) 1, 2 and 3

(b) 1 and 2 only

(c) 1 and 3 only

(d) 2 and 3 only

88. The standard deviation σ for sampling in the case of concrete for construction engineering and management is

(a) $\sqrt{\frac{\Sigma(X + \bar{X})^2}{N + 1}}$

(b) $\sqrt{\frac{\Sigma(X - \bar{X})^2}{N + 1}}$

(c) $\sqrt{\frac{\Sigma(\bar{X} + X)^2}{N - 1}}$

(d) $\sqrt{\frac{\Sigma(X - \bar{X})^2}{N - 1}}$

where

$X_1, X_2, X_3, X_4, \dots, X_n$ = Compressive strengths of the individual cubes

N = Number of cubes tested

\bar{X} = Average of series of compressive strength values

89. Which of the following variations are true in piece part production?

1. Piece-to-piece variation
2. Time-to-time variation
3. Within-piece variation
4. Process-to-process variation

(a) 1, 2 and 4

(b) 1, 3 and 4

(c) 2, 3 and 4

(d) 1, 2 and 3

90. Which one of the following is the objective of attribute charts in production process control?

- (a) To determine the acceptance criteria of a product before production
- (b) To evaluate the quality performance of operating and management personnel
- (c) To keep a periodic record of a particular characteristic
- (d) To determine the highest quality level

91. Which one of the following regions is characterized by sensitive ecosystems, enhanced occurrences of extreme weather events and natural catastrophes?

- (a) Mountain region
- (b) Evergreen forest region
- (c) Tropical region
- (d) Tundra region

92. Which one of the following is an iterative and evolutionary process for achieving sustainable development?

- (a) Flood Control Management (FCM)
- (b) Solid Waste Management (SWM)
- (c) Integrated Coastal Zone Management (ICZM)
- (d) Natural Ecosystem Zone (NEZ)

93. Which of the following practices are adopted for river basin water resources management?

1. Soil conservation in catchments of river valley projects and flood-prone rivers
 2. Soil and land use surveys
 3. Control of shifting cultivation
 4. Deforestation
- (a) 1, 2 and 4
 - (b) 1, 3 and 4
 - (c) 2, 3 and 4
 - (d) 1, 2 and 3

94. According to the Stokes' law, the rate of settling of the particles depends on the terminal settling velocity v_t which is

- (a) $\frac{gd_p^2}{18\mu_a} (\rho_p - \rho_a) \left(1 + \frac{2C}{d_p P}\right)$
- (b) $\frac{gd_p^2}{18\mu_a} (\rho_p + \rho_a) \left(1 - \frac{2C}{d_p P}\right)$
- (c) $\frac{gd_p^2}{18\mu_a} (\rho_p - \rho_a) \left(1 - \frac{2C}{d_p P}\right)$
- (d) $\frac{gd_p^2}{18\mu_a} (\rho_p + \rho_a) \left(1 + \frac{2C}{d_p P}\right)$

where

- d_p = Particle diameter
- ρ_p = Density of particle
- ρ_a = Density of air
- μ_a = Velocity of air
- P = Air pressure
- C = Constant

95. The sound level L is

(a) $\log_{10} \frac{Q_0}{Q}$ (bels)

(b) $20 \log_{10} \frac{Q}{Q_0}$ (bels)

(c) $\log_{10} \frac{Q}{Q_0}$ (bels)

(d) $20 \frac{Q}{Q_0} + \log_{10} \frac{Q}{Q_0}$ (bels)

where

Q = Measured quantity of sound pressure or sound intensity

Q_0 = Reference standard quantity of sound pressure

96. Which one of the following is a hygienic way of disposing solid waste and is more suitable if the waste contains more hazardous material and organic content?

(a) Composting

(b) Incineration

(c) Oxidation

(d) Subgrading

97. NEPA stands for

(a) National Ecological Physical Area

(b) Natural Environmental Policy Act

(c) National Environmental Policy Act

(d) Natural Ecological Primary Area

98. Which one of the following gases is colourless with strong odour, irritates mucous membranes at common levels, can cause cough, fatigue and interference with lung functions at higher concentration?

(a) Carbon monoxide

(b) Hydrogen

(c) Ozone

(d) Nitrogen

99. Basel Convention provides

(a) Indian standards for pollution measurement and prevention

(b) international guidelines to control the transboundary movements of hazardous wastes between different countries

(c) Indian standards for the disposal of municipal and industrial wastes

(d) international standards to categorize pollution in air and wastewater

100. Which of the following are the suggested ways of reducing NO_x emissions from stationary sources?

1. By reducing the peak temperature

2. By increasing the availability of N_2 for reaction with O_2

3. By minimizing the availability of O_2 for reaction with N_2

(a) 1 and 2 only

(b) 1 and 3 only

(c) 2 and 3 only

(d) 1, 2 and 3