# Entrance Examinations – 2022
# Ph.D. Management Studies

**Maximum marks:** 70

**Time:** 2 Hours

**Hall ticket Number**

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**General Instructions:**

1. Write your Hall Ticket Number in the OMR Answer Sheet. Also, write the Hall Ticket Number in the space provided above.

2. This question paper consists of Two Parts - **Part 'A' and Part 'B'** which carries 70 objective-type questions of one mark each for a total of 70 marks.

3. Answers are to be marked on the OMR answer sheet following the instructions provided there upon.

4. Hand over the OMR answer sheet at the end of the examination to the Invigilator.

5. No additional sheets will be provided. Rough work can be done in the question paper itself.

6. **Calculators, mobile phones and any electronic gadgets are not allowed.**

## PART A

1. There are two sets given below. Set – I specify the types of research, while Set –II indicates their characteristics. Match the two and give your answer by selecting the appropriate code.

Set – I (Research types)          Set – II (Characteristics)

(a) Fundamental research    (i) Finding out the extent of perceived impact of an intervention

(b) Applied research    (ii) Developing an effective explanation through theory building

(c) Action research    (iii) Improving an existing situation through use of interventions

(d) Evaluative research    (iv) Exploring the possibility of a theory for use in various situations

(v) Enriching technological resources

Codes:

|     | (a)    | (b)    | (c)    | (d)   |
|-----|--------|--------|--------|-------|
| A.  | (ii)   | (iv)   | (iii)  | (i)   |
| B.  | (v)    | (iv)   | (iii)  | (ii)  |
| C.  | (iii)  | (ii)   | (iii)  | (iv)  |
| D.  | (ii)   | (iii)  | (iv)   | (v)   |

2. Statement 1: Relationship between two variables are referred as hypothesis.
   Statement 2: Relationship between two concepts are referred as propositions.
   A. Statement 1 only correct
   B. Statement 2 only correct
   C. Statement 1 is correct and statement 2 is wrong
   D. Statement 1 and 2 are correct

3. Theory testing research uses one of the following reasoning:
   A. Inductive reasoning
   B. Deductive reasoning
   C. Decompositional reasoning
   D. None of the above

4. _____is the study of nature of reality.
   A. Epistemology
   B. Paradigm
   C. Ontology
   D. Axiology

5. Statement 1: A law describes why it happens.
   Statement 2: A theory describes what happens.
   A. Statement 1 only correct
   B. Statement 2 only correct
   C. Statement 1 and 2 are wrong
   D. Statement 1 and 2 are correct

6. Statement 1: Construct is not directly observed.
   Statement 2: Variable is indirectly observed.
   A. Statement 1 only correct
   B. Statement 2 only correct
   C. Statement 1 and 2 are wrong
   D. Statement 1 and 2 are correct

7. Statement 1: In multiple linear regression model more than one independent variable is considered.
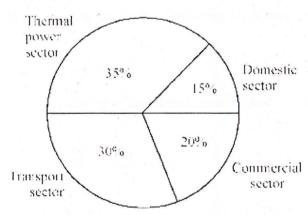   Statement 2: In multiple linear regression model constant is always positive.
   - A. Statement 1 only correct
   - B. Statement 2 only correct
   - C. Statement 1 and 2 are wrong
   - D. Statement 1 and 2 are correct

8. _____type of research design is useful to establish the cause and effect relationship among the variables.
   - A. Grounded theory design
   - B. Discourse analysis design
   - C. Experimental design
   - D. Semiotics design

9. A researcher has measured the room temperature in degree Celsius. Which type of measurement is used by the researcher?
   - A. Nominal
   - B. Ordinal
   - C. Interval
   - D. Ratio

10. To measure the association between two categorical variables are analysed using the following technique:
   - A. Pearson correlation coefficient
   - B. ANOVA
   - C. T-test
   - D. Chi-Square analysis

11. In how many of the distinct permutations of the letters in the word 'MISSISSIPPI' do the 4 I's not come together?
   - A. 840
   - B. 33,810
   - C. 34,650
   - D. 39,916,800

12. Three unbiased coins are tossed. What is the probability of getting at most two heads?
   - A. 3/4
   - B. 1/4
   - C. 3/8
   - D. 7/8

13. A card is drawn from a pack of 52 cards. The probability of getting a queen of club or a king of heart is:
   - A. 1/13
   - B. 2/13
   - C. 1/26
   - D. 1/52

14. An entomologist spots what might be a rare subspecies of beetle, due to the pattern on its back. In the rare subspecies, 98% have the pattern, or P (Pattern | Rare) = 98%. In the common subspecies, 5% have the pattern. The rare subspecies accounts for only 0.1% of the population. How likely is the beetle having the pattern to be rare, or what is P (Rare | Pattern)?

    A. 1.2%
    B. 1.5%
    C. 1.9%
    D. 2.5%

15. In a class of 120 students numbered 1 to 120, all even numbered students opt for Physics, whose numbers are divisible by 5 opt for Chemistry and those whose numbers are divisible by 7 opt for Math. How many opt for none of the three subjects?

    A. 39
    B. 41
    C. 45
    D. 56

16. What is the inverse of the matrix $A = \begin{bmatrix} 5 & -1 \\ 1 & 2 \end{bmatrix}$?

    A. $\dfrac{1}{11}\begin{bmatrix} 2 & 1 \\ -1 & 5 \end{bmatrix}$
    B. $\dfrac{1}{11}\begin{bmatrix} 5 & -1 \\ 1 & 2 \end{bmatrix}$
    C. $\dfrac{1}{11}\begin{bmatrix} -5 & 1 \\ 1 & -2 \end{bmatrix}$
    D. $\dfrac{1}{11}\begin{bmatrix} -5 & 1 \\ -1 & -2 \end{bmatrix}$

**Question 17 and 18 are based on the following statement and figure:**

The total $CO_2$ emissions from various sectors are 5 mmt. In the Pie Chart given below, the percentage contribution to $CO_2$ emissions from various sectors is indicated.



17. What is the absolute $CO_2$ emission from domestic sector?

    A. 1.5 mmt
    B. 2.5 mmt
    C. 1.75 mmt
    D. 0.75 mmt

18. What is the absolute $CO_2$ emission for combined thermal power and transport sectors?
     A. 3.25 mmt
     B. 1.5 mmt
     C. 2.5 mmt
     D. 4 mmt

19. What is the Standard Deviation of the following data set?
     7, 8, 26, 11, 15, 21, 18, 6
     A. 6.2
     B. 6.4
     C. 6.6
     D. 6.8

20. A standard normal distribution has which of the following properties?
     A. The mean and the variance both equal.
     B. The mean is equal to the standard deviation.
     C. The mean is equal to 0 and the variance is equal to 1.
     D. The mean is equal to the variance.

21. What percentage of a normal distribution is found within a range of z scores from -2 to +2?
     A. 90.26
     B. 92.72
     C. 94.56
     D. 95.44

22. What information is provided by the coefficient of determination?
     A. Whether r has any significance
     B. The proportion of total variation in Y that is explained by X
     C. Whether total variation should be partitioned
     D. The coefficient of correlation is larger than one

23. How do you commit a Type II error in testing of hypothesis?
     A. Reject a null hypothesis that is true.
     B. Fail to reject a null hypothesis that is true.
     C. Fail to reject a null hypothesis that is false.
     D. Reject a null hypothesis that is false.

**Passage: Electric Vehicles (Question 24 to 28)**

The end of the age of the internal combustion engine is in sight. There are small signs everywhere: the shift to hybrid vehicles is already under way among manufacturers. Volvo has announced it will make no purely petrol-engined cars after 2019...and Tesla has just started selling its first electric car aimed squarely at the middle classes: The Tesla 3 sells for $35,000 in the US, and 400,000 people have put down a small, refundable deposit towards one. Several thousand have already taken delivery, and the company hopes to sell half a million more next year. This is a remarkable figure for a machine with a fairly short range and a very limited number of specialised charging stations.

Some of it reflects the remarkable abilities of Elon Musk, the company's founder, as a salesman, engineer, and a man able to get the most out his factory workers and the governments he deals with...Mr Musk is selling a dream that the world wants to believe in. This last may be the most important factor in the story. The private car is...a device of immense practical help and economic significance, but at the same time a theatre for myths of unattainable self-fulfilment. The one thing you will never see in a car advertisement is traffic, even though that is the element in which drivers spend their lives. Every single driver in a traffic jam is trying to escape from it, yet it is the inevitable consequence of mass car ownership.

The sleek and swift electric car is at one level merely the most contemporary fantasy of autonomy and power. But it might also disrupt our exterior landscapes nearly as much as the fossil fuel-engined car did in the last century. Electrical cars would of course pollute far less than fossil fuel-driven ones; instead of oil reserves, the rarest materials for batteries would make undeserving despots and their dynasties fantastically rich. Petrol stations would disappear. The air in cities would once more be breathable and their streets as quiet as those of Venice. This isn't an unmixed good. Cars that were as silent as bicycles would still be as dangerous as they are now to anyone they hit without audible warning.

The dream goes further than that. The electric cars of the future will be so thoroughly equipped with sensors and reaction mechanisms that they will never hit anyone. Just as brakes don't let you skid today, the steering wheel of tomorrow will swerve you away from danger before you have even noticed it.

This is where the fantasy of autonomy comes full circle. The logical outcome of cars which need no driver is that they will become cars which need no owner either. Instead, they will work as taxis do, summoned at will but only for the journeys we actually need. This the future towards which Uber...is working. The ultimate development of the private car will be to reinvent public transport. Traffic jams will be abolished only when the private car becomes a public utility. What then will happen to our fantasies of independence? We'll all have to take to electrically powered bicycles.

24. Which of the following statements best reflects the author's argument?
   A. Hybrid and electric vehicles signal the end of the age of internal combustion engines.
   B. Elon Musk is a remarkably gifted salesman.
   C. The private car represents an unattainable myth of independence.
   D. The future Uber car will be environmentally friendlier than even the Tesla.

25. The author points out all of the following about electric cars EXCEPT
   A. Their reliance on rare materials for batteries will support despotic rule.
   B. They will reduce air and noise pollution.
   C. They will not decrease the number of traffic jams.
   D. They will ultimately undermine rather than further driver autonomy.

26. According to the author, the main reason for Tesla's remarkable sales is that
   A. in the long run, the Tesla is more cost effective than fossil fuel-driven cars.
   B. the US government has announced a tax subsidy for Tesla buyers.
   C. the company is rapidly upscaling the number of specialised charging stations for customer convenience.
   D. people believe in the autonomy represented by private cars.

27. The author comes to the conclusion that
   A. car drivers will no longer own cars but will have to use public transport.
   B. cars will be controlled by technology that is more efficient than car drivers.
   C. car drivers dream of autonomy but the future may be public transport.
   D. electrically powered bicycles are the only way to achieve autonomy in transportation.

28. In paragraphs 4 and 5, the author provides the example of Uber to argue that
    A. in the future, electric cars will be equipped with mechanisms that prevent collisions.
    B. in the future, traffic jams will not exist.
    C. in the future, the private car will be transformed into a form of public transport.
    D. in the future, Uber rides will outstrip Tesla sales.

29. Another name for a cross-tabulation is:
    A. ANOVA
    B. Z-test
    C. contingency table
    D. between-group variance

30. If 25 of the 35 females in a research study agree with a statement, and 15 of the 35 males agree with this statement, the expected value for males-agree is:
    A. 15
    B. 20
    C. 25
    D. 35

31. If the critical value of chi-square in the chi-square table is 3.84, and the obtained value of chi-square in the study is 3.45, the researcher should:
    A. reject the null hypothesis
    B. accept the null hypothesis
    C. accept the research hypothesis
    D. reject both the null and the research hypotheses

32. Supposed you used a 10-point rating scale to measure intention-to-buy (1 = definitely would not buy and 10 = definitely would buy). If a group of 40 males had a mean of 7 and a standard deviation of 2.5, while a group of 35 females had a mean of 5 and a standard deviation of 1.4, the standard error of the difference between the means would be approximately:
    A. 0.48
    B. 1.36
    C. 2.45
    D. not enough information to determine

33. If the regression equation is: $Y = -4.2 + 3.6 X$, then the expected score for Y when X is 4 would be:
    A. -18.6
    B. 10.2
    C. 18.6
    D. 4

34. _____ is the application of morals to business behaviour related to the exchange environment.
    A. Moral relativism
    B. Moral idealism
    C. Business idealism
    D. Business ethics

35. One right a research participant has is that information involved in the research will not be shared with others, which is known as:
    A. consent
    B. active research
    C. passive research
    D. confidentiality

## PART B

36. Using a successful brand name to introduce additional items in a given product category under the same brand name (such as new flavors, forms, colors, added ingredients, or package sizes) is known as:
    A. Line extension.
    B. Brand extension.
    C. Multi-branding.
    D. New brands.

37. In terms of special product life cycles, a _____ is a basic and distinctive mode of expression.
    A. Genre
    B. Style
    C. Fashion
    D. Fad

38. _____ is a person's distinguishing psychological characteristics that lead to relatively consistent and lasting responses to his or her own environment.
    A. Psychographics
    B. Personality
    C. Demographics
    D. Lifestyle

39. Cognitive dissonance occurs in which stage of the buyer decision process model?
    A. Need recognition
    B. Information search
    C. Evaluation of alternatives
    D. Post purchase behavior

40. Strategic business unit with low market share and high market growth is considered as
    A. Cash Cows
    B. Stars
    C. Dogs
    D. Question marks

41. What type of data should the dependent variable be in logistic regression?
    A. Discrete
    B. Random
    C. Continuous
    D. None of the above

42. What is the term for the estimate of the impact an independent variable has on the dependent variable?
    A. Coefficient
    B. R-squared
    C. Standard Error
    D. p-value

43. In the context of machine learning_____ data is used to tweak models and to compare performance across models.
    A. Training data
    B. Nominal data
    C. Hold-out data
    D. Validation data

44. Dimension reduction is an example of:
    A. Supervised Learning
    B. Unsupervised Learning
    C. Reinforcement Learning
    D. None of the above

45. _____ is the difference between the predicted data points and the actual data points which was caused because the model was oversimplified.
    A. Bias error
    B. Variance error
    C. Testing error
    D. None of the above

46. _____ represents the trade-off between risk & expected return faced by and investor when forming this portfolio
    A. Efficient set
    B. Efficient frontier
    C. Attainable set
    D. Risk diversification

47. Determinants of Mergers and Acquisitions
    A. Technological advancements
    B. Business practices
    C. Economic factors
    D. All of the above

48. A Material Requirement Planning (MRP) is a _____ system to coordinate purchasing, manufacturing, and delivery
    A. Computer based
    B. Complicated
    C. Requirement
    D. Human resource

49. Assuming no safety stock, what is the re-order point (R) given an average daily demand of 50 units, a lead time of 10 days and 625 units on hand?
    A. 550
    B. 715
    C. 450
    D. 475

50. If annual demand is 12,000 units, the ordering cost is $6 per order and the holding cost is $2.50 per unit per year, which of the following is the optimal order quantity?
    A. 576
    B. 240
    C. 170
    D. 60.6

51. Internet based recruitment is a method of
    A. Internal Recruitment
    B. External Recruitment
    C. Global Recruitment
    D. Retention

52. Vestibule training is a method of
    A. Off the job training
    B. On the job training
    C. Perspective of training
    D. Evolution of training

53. The act of overcoming distrust and animosity for better industrial relations is known as
    A. Conciliation
    B. Arbitration
    C. Adjudication
    D. Collectivistic principle
54. Fiedler proposed the
    A. Contingency model of leadership
    B. Path goal theory of leadership
    C. Group and exchange theory of leadership
    D. Autocratic – participative theory of leadership
55. Immaturity – maturity theory was proposed by
    A. Maslow
    B. Alderfer
    C. Chris Argyris
    D. Victor Vroom
56. Which of the following relation is correct?
    A. Mode= 3 Mean-2 Median
    B. Mode= 3 Median-2 Mean
    C. Mode= (Mean + Median)/2
    D. Mode= $\sqrt{Mean^2 - Median^2}$
57. If the mean of a sample is 55 and standard deviation is 7. What is the Coefficient of Variation?
    A. 12.73
    B. 12.71
    C. 12.64
    D. 12.66
58. If the variance of a population is 729 and sample size is 1681, what is standard error?
    A. 0.58
    B. 0.66
    C. 0.54
    D. 0.62
59. A _____ sample is formed by selecting one unit at random and then selecting additional units at evenly spaced intervals until the sample has been formed.
    A. Stratified random
    B. Systematic random
    C. Cluster random
    D. Simple Random
60. Which of the following statements regarding Gantt charts is true?
    A. Gantt charts give a timeline and precedence relationships for each activity of a project
    B. Gantt charts use the four standard spines: Methods, Materials, Manpower, and Machinery
    C. Gantt charts are visual devices that show the duration of activities in a project
    D. Gantt charts are expensive
61. The tracking signal is the:
    A. Standard error of the estimate
    B. Cumulative error
    C. Mean Absolute Deviation(MAD)
    D. Ratio of the cumulative error to MAD

62. Sustainability deals:
  A. Solely not with green products, recycling, global warming and rain forests
  B. With keeping products that are not recyclable
  C. With meeting the needs of present and future generations
  D. With three views – Systems, commons, and defects

63. The process of identifying other organisations that are best at some facet of your operations and then modeling your organisation after them is known as:
  A. Continuous improvement
  B. Employee empowerment
  C. Patent infringement
  D. Benchmarking

64. If the mean of a particular sample is within control limits and the range of that sample is not within control limits:
  A. The process is in control, with only assignable causes of variation
  B. The process is not producing within the established control limits
  C. The process is producing within the established control limits, with only natural causes of variation
  D. The process has both natural and assignable causes of variation

65. Which one is not the objective of industrial licensing in India?
  A. To limit industrial capacity within the targets set by the five-year plans
  B. To direct investment in industries according to five-year plan priorities
  C. To regulate the location of industrial units so as to secure a balanced regional development
  D. To prevent both oligopoly and distribution of wealth

66. Which is not the motive of horizontal merger of firms.
  A. To benefit from economies of scale
  B. Greater market share
  C. Reaction to monopoly
  D. Rationalisation of output

67. _____ is often described as "doing the right things".
  A. Efficiency
  B. Management
  C. Effectiveness
  D. Tolerance

68. _____ policy is not clearly stated, but oral understanding.
  A. Written
  B. Appealed
  C. Implied
  D. Government

69. Mechanistic structure is most useful for:
  A. Unit production oriented organisation
  B. Mass production oriented organisation
  C. Process production oriented organisation
  D. None of the above

70. India's indigenous COVID-19 vaccine by Bharat Biotech is developed in collaboration with
    A. Indian Council of Medical Research (ICMR) - National Institute of Virology (NIV)
    B. Indian Council of Medical Research (ICMR)- Centre for Cellular and Molecular Biology
    C. National Institute of Immunology (NII)
    D. Department of Science and Technology

School of Management Studies
PhD Management Entrance Key

| Q No | Key | Q No | Key |
|------|-----|------|-----|
| 1 | A | 36 | A |
| 2 | D | 37 | B |
| 3 | B | 38 | B |
| 4 | C | 39 | D |
| 5 | C | 40 | D |
| 6 | A | 41 | A |
| 7 | A | 42 | A |
| 8 | C | 43 | D |
| 9 | C | 44 | B |
| 10 | D | 45 | A |
| 11 | B | 46 | B |
| 12 | D | 47 | D |
| 13 | C | 48 | A |
| 14 | C | 49 | A |
| 15 | B | 50 | C |
| 16 | A | 51 | B |
| 17 | D | 52 | B |
| 18 | A | 53 | A |
| 19 | D | 54 | A |
| 20 | C | 55 | C |
| 21 | D | 56 | B |
| 22 | B | 57 | A |
| 23 | C | 58 | B |
| 24 | C | 59 | B |
| 25 | D | 60 | C |
| 26 | D | 61 | D |
| 27 | C | 62 | C |
| 28 | C | 63 | D |
| 29 | C | 64 | B |
| 30 | B | 65 | D |
| 31 | B | 66 | C |
| 32 | A | 67 | C |
| 33 | B | 68 | C |
| 34 | D | 69 | B |
| 35 | D | 70 | A |