K. K. Wagh Institute of Engineering Education and Research, Nashik

(An Autonomous Institute from A. Y. 2022-23)

End-Sem Examination- Winter 2023

Exam Seat No.										

Academic Year: 2025-2026	**Semester: III**
Name of Programme: MBA	**Pattern: 2024**
Name of Course: Marketing Research	**Course Code: 2410612A**
Max. Marks: 60	**Duration: 2:30Hr.**

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains _____page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question

Q. No.	Details
Q.1	Apply the knowledge of Hypothesis testing to find out type of test (One tailed or Two tailed), Z test or T test and also write the required test statistics while solving below problems. 1) Test whether the placement given by the ABC college is 90% or not, if 120 students out of 150 got the placement in current year. **Data:** $n = 150$, placed $x = 120 \Rightarrow \hat{p} = 0.80$. **Parameter:** Population placement proportion p. **Test type: Two-tailed** (is it 90% or not). **Test: Z-test for a single proportion** (large n). **Hypotheses:** • $H_0: p = 0.90$ • $H_1: p \neq 0.90$ 2) Test whether the particular medicine is effective in decreasing the BP level or not if the data of 25 people is collected for the study. **Data:** 25 people, before–after BP measured. **Parameter:** Mean change in BP, μ_d(After − Before). **Test type: One-tailed** (effective in decreasing ⇒ mean change < 0). **Test: Paired t-test** (small sample, unknown σ). **Hypotheses:**

	• $H_0: \mu_d = 0$(no average change) • $H_1: \mu_d < 0$(average decrease)
Q.2	Explain Semantic differential scales Semantic differential scales measure attitudes by asking respondents to rate a concept across bipolar adjective pairs on a multi-point scale (typically 7 points). Example anchors include "Unfriendly–Friendly," "Ineffective–Effective," "Unreliable–Reliable." Respondents mark a position between each pair, producing a profile across dimensions that captures connotative meaning. They are efficient for capturing nuanced perceptions and are widely used in branding, service quality, and image studies.
Q.3	a) Explain Regression Analysis with the example. • **Idea:** Model a dependent variable Yas a function of predictors $X$to explain and predict outcomes. • **Simple linear model:** $Y = a + bX + \varepsilon$. • **Example dataset:** (X, Y): $(5,10), (9,15), (8,18), (10,20), (2,5)$. • **Estimates:** $$\bar{X} = 6.8,\ \bar{Y} = 13.6,\ b = \frac{S_{XY}}{S_{XX}} \approx 1.789,\ a = \bar{Y} - b\bar{X} \approx 1.432.$$ • **Interpretation:** For each 1-unit increase in X, Yincreases by about 1.789 on average; intercept 1.432. • **Prediction (illustrative):** If $X = 15$, $\hat{Y} = a + b \cdot 15 \approx 28.26$. **OR** b) Explain Factor Analysis with the example. **Idea:** Reduce many correlated observed variables into fewer latent factors that explain common variance. **Process:** Check suitability (KMO, Bartlett), extract factors (e.g., principal axis), rotate (varimax) for interpretability, and interpret loadings. **Example:** A survey with 10 service items might yield two factors—"Service Quality" (items on responsiveness, reliability) and "Tangibles" (items on cleanliness, facilities)—if items load strongly (>0.5) on distinct factors, enabling composite scores and streamlined modeling.
	c) Suppose you are doing one research on quality of education in Nashik and you are going to collect samples from different schools. So, prepare questioner for your research with 12 questions in it. **Demographics: School and class:** Name of school; current class/grade. **Teacher clarity: Explanations clarity:** Never/Rarely/Sometimes/Often/Always.

	Curriculum relevance: Real-life applicability: 1–5 Likert. **Resources: Textbooks/labs/technology adequacy:** Yes/No; if No, specify. **Classroom environment: Comfort asking questions:** 1–5 Likert. **Assessment alignment: Tests reflect taught content:** 1–5 Likert. **Feedback quality: Timeliness/helpfulness of feedback:** 1–5 Likert. **Homework load: Appropriate workload:** 1–5 Likert. **Infrastructure: Cleanliness, seating, lighting:** 1–5 Likert. **Extracurriculars: Availability and organization:** Yes/No; satisfaction 1–5. **Learning outcomes: Confidence in meeting outcomes:** 1–5 Likert. **Overall satisfaction: Education quality overall:** 1–5 Likert. **OR** d) Suppose you are doing one research on impact of noise pollution on small children's health and you are going to collect samples from different schools. So, prepare questioner for your research with 12 questions in it. **Demographics: Child age/class and school location type:** Near highway/market/industrial/quiet. **Exposure frequency: Loud noise at school/home:** Never to Always (5-point). **Exposure duration: Approx. daily noisy hours:** Numeric. **Sleep disturbances: Noise disturbed sleep in past week:** Yes/No; times. **Concentration: Noise affects attention in class:** 1–5 Likert. **Physical symptoms: Headaches/ear pain linked to noise:** Never to Often. **Mood: Irritability or stress in noisy settings:** 1–5 Likert. **Academic impact: Perceived learning impact:** 1–5 Likert. **Protective actions: Use of ear protection/quiet zones:** Yes/No; specify. **School measures: Noise monitoring/mitigation policies:** Yes/No; effectiveness 1–5. **Medical visits: Recent visits for hearing/stress:** Yes/No. **Overall risk: Harmfulness of noise to child health:** 1–5 Likert.
Q.4	a) K K Wagh college wants select college GS from the students. For that college demands nomination list form MBA, Chemical, E&TC, Chemical and Civil department. College got list of 6 students from each department. Now college wants to draw random sample of 5 students for further analysis. Draw 5 students using below methods. (Write down sample points for each method). 1) SRSWOR 2) Systematic Sampling 3) Cluster sampling 4) Stratified sampling **SRSWOR: Method:** Randomly select 5 unique IDs from all 24. • **Sample points (example):** MBA3, CHE5, ETC2, CIV6, MBA1.

Systematic sampling: Method: Order the 24; choose random start $r \in \{1, \ldots, 4\}$; interval $k = \lfloor 24/5 \rfloor = 4$; pick every 4th.

- **Sample points (example, $r = 2$):** 2nd, 6th, 10th, 14th, 18th in the ordered list.

Cluster sampling: Method: Treat each department as a cluster; one- or two-stage selection.

- **Sample points (two-stage example):** Choose clusters MBA and ETC; pick MBA2, MBA5; ETC1, ETC3, ETC6.

Stratified sampling: Method: Stratify by department; proportional or equal allocation; SRS within strata.

- **Sample points (equal allocation 1 per stratum + extra to any):** MBA4, CHE2, ETC5, CIV1, CHE6.

OR

b) Government of India wants to check whether new GST rates are beneficial or not. For that Government sends team of members to collect the sample from Mumbai, Nashik, Satara, Belgaum, Pune and Hydrabad locations. Government got 10 samples from each of the place. Now draw 12 samples using below methods. (Write down sample points for each method).

1) SRSWR
2) Systematic Sampling
3) Cluster sampling
4) Stratified sampling

SRSWR: Method: Draw 12 with replacement from all 60.

- **Sample points (example):** MU3, NA7, PU10, SA2, BE9, HY1, MU3, PU1, NA4, SA9, BE2, HY8.

Systematic sampling: Method: Order 60; choose random start $r \in \{1, \ldots, 5\}$; interval $k = \lfloor 60/12 \rfloor = 5$.

- **Sample points (example, $r = 4$):** 4th, 9th, 14th, …, 59th.

Cluster sampling: Method: Treat each city as a cluster; select clusters then sample within.

- **Sample points (two clusters, 6 each):** Select NA, PU; pick NA1, NA3, NA5, NA7, NA9, NA10; PU2, PU4, PU5, PU6, PU8, PU10.

Stratified sampling: Method: Stratify by city; allocate proportionally (2 per city across 6 cities = 12); SRS within each.

- **Sample points (example):** MU2, MU7; NA1, NA10; SA3, SA8; BE4, BE9; PU6, PU11; HY5, HY10.

c) Explain Type I Error and Type II error with the help of an example.

Type I error: Definition: Rejecting a true H_0(false positive). **Rate:** α.

- **Example:** Testing if a fair coin is biased; concluding "biased" when it's actually fair.

Type II error: Definition: Failing to reject a false H_0(false negative). **Rate:** β; power

	$= 1 - \beta$. • **Example:** A genuinely effective medicine reduces BP, but your test concludes "no effect." **OR** d) Explain correlation coefficient with the help of an example. **Idea:** Pearson correlation $r$measures linear association between two variables $(-1$ to $+1)$. **Example data:** Study hours vs. test scores: $(2,50), (4,60), (6,70), (8,85), (10,92)$. **Computation (outline):** Compute covariance $S_{XY}$and standard deviations S_X, S_Y; $r = S_{XY}/(S_X S_Y)$. **Interpretation:** A high positive r(e.g., > 0.8) suggests more study hours align with higher scores. Positive, Negative and No Correlation
Q.5	a) Production manager claims that 6% of their mangoes are rotten. From the sample of 500 mangoes 400 mangoes are of good quality. Test whether the claim made by manager is right or wrong at 95% level of significance. **$Z_{95\%}$ = 1.96** • **Claim: $p = 0.06$. Sample: $n = 500$, good $= 400 \Rightarrow$rotten $= 100 \Rightarrow \hat{p} = 0.20$.** • **Hypotheses: $H_0: p = 0.06$; $H_1: p \neq 0.06$(two-tailed).** • **Test statistic:** $$Z = \frac{\hat{p} - p_0}{\sqrt{p_0(1-p_0)/n}} = \frac{0.20 - 0.06}{\sqrt{0.06 \cdot 0.94/500}} \approx \frac{0.14}{0.0106} \approx 13.2.$$ • **Decision (5% or 95%): $\mid Z \mid \gg 1.96$. Conclusion: Reject H_0. The 6% claim is not supported; observed rotten proportion is much higher.** **OR** b) A coin is tossed 1000 times and it turns up tail 600 times. Discuss at 5% level whether the coin is unbiased or not. **$Z_{95\%}$ = 1.96** • **Hypotheses: $H_0: p = 0.5$(fair); $H_1: p \neq 0.5$(two-tailed).** • **Data: $n = 1000$, $x = 600 \Rightarrow \hat{p} = 0.60$.** • **Test statistic:** $$Z = \frac{0.60 - 0.50}{\sqrt{0.5 \cdot 0.5/1000}} = \frac{0.10}{0.01581} \approx 6.33.$$ • **Decision (5%): $\mid Z \mid > 1.96$. Conclusion: Reject H_0. The coin appears biased.**

c) Find out rank correlation for below data.

Sr No	Maths	Statistics
1	**15**	**25**
2	**18**	**20**
3	**25**	**18**
4	**20**	**20**
5	**15**	**25**
6	**18**	**16**

- Maths: 15, 18, 25, 20, 15, 18
- Statistics: 25, 20, 18, 20, 25, 16
- **Average ranks (ties handled):**
  - **Maths:** 1.5, 3.5, 6, 5, 1.5, 3.5
  - **Statistics:** 5.5, 3.5, 2, 3.5, 5.5, 1
- **Spearman's ρ:** Pearson correlation of ranks:

$$\rho \approx -0.712.$$

- **Interpretation:** Moderate-to-strong negative association between Maths and Statistics ranks in this sample.

OR

d) Find out the value of Y if X = 15 using below information using regression analysis.

Sr No	X	Y
1	5	10
2	9	15
3	8	18
4	10	20
5	2	5
6	15	?

Data:

- $(X, Y) = (5,10), (9,15), (8,18), (10,20), (2,5).$
- **Estimates:**

$$\bar{X} = 6.8, \bar{Y} = 13.6, b \approx 1.789, a \approx 1.432.$$

- **Prediction:**

$$\hat{Y} = a + b \cdot 15 \approx 28.26.$$