

## Common Techniques of Marking Answer Scripts.

It is compulsory to adhere to the following standard method in marking answer scripts and entering marks into the mark sheets.

1. Use a red color ball point pen for marking. (Only Chief/Additional Chief Examiner may use a mauve color pen.)
2. Note down Examiner's Code Number and initials on the front page of each answer script.
3. Write off any numerals written wrong with a clear single line and authenticate the alterations with Examiner's initials.
4. Write down marks of each subsection in a  $\triangle$  and write the final marks of each question as a rational number in a  $\square$  with the question number. Use the column assigned for Examiners to write down marks.

### Example: Question No. 03

|       |                         |   |                              |
|-------|-------------------------|---|------------------------------|
| (i)   | .....<br>.....<br>..... | ✓ | $\triangle$<br>$\frac{4}{5}$ |
| (ii)  | .....<br>.....<br>..... | ✓ | $\triangle$<br>$\frac{3}{5}$ |
| (iii) | .....<br>.....<br>..... | ✓ | $\triangle$<br>$\frac{3}{5}$ |

|                                                                                                                                                            |     |               |   |      |               |   |       |               |   |                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------|---|------|---------------|---|-------|---------------|---|---------------------------------------------------------------------------------------------------------------|
| <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center;">03</div> | (i) | $\frac{4}{5}$ | + | (ii) | $\frac{3}{5}$ | + | (iii) | $\frac{3}{5}$ | = | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <math>\frac{10}{15}</math> </div> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------|---|------|---------------|---|-------|---------------|---|---------------------------------------------------------------------------------------------------------------|

### MCQ answer scripts: (Template)

1. Marking templates for G.C.E.(A/L) and GIT examination will be provided by the Department of Examinations itself. Marking examiners bear the responsibility of using correctly prepared and certified templates.
2. Then, check the answer scripts carefully. If there are more than one or no answers Marked to a certain question write off the options with a line. Sometimes candidates may have erased an option marked previously and selected another option. In such occasions, if the erasure is not clear write off those options too.
3. Place the template on the answer script correctly. Mark the right answers with a '✓' and the wrong answers with a 'X' against the options column. Write down the number of correct answers inside the cage given under each column. Then, add those numbers and write the number of correct answers in the relevant cage.

**Structured essay type and essay type answer scripts:**

1. Cross off any pages left blank by candidates. Underline wrong or unsuitable answers. Show areas where marks can be offered with check marks.
2. Use the right margin of the overland paper to write down the marks.
3. Write down the marks given for each question against the question number in the relevant cage on the front page in two digits. Selection of questions should be in accordance with the instructions given in the question paper. Mark all answers and transfer the marks to the front page, and write off answers with lower marks if extra questions have been answered against instructions.
4. Add the total carefully and write in the relevant cage on the front page. Turn pages of answer script and add all the marks given for all answers again. Check whether that total tallies with the total marks written on the front page.

**Preparation of Mark Sheets.**

Except for the subjects with a single question paper, final marks of two papers will not be calculated within the evaluation board this time. Therefore, add separate mark sheets for each of the question paper. Write paper 01 marks in the paper 01 column of the mark sheet and write them in words too. Write paper II Marks in the paper II Column and write the relevant details. For the subject 51 Art, marks for Papers 01, 02 and 03 should be entered numerically in the mark sheets.

\*\*\*



5. The import of a commodity increased by 20% in 2008, decreased by 18% in 2009 and then increased by 30% in the following year. The increase or decrease in each year is measured relative to its previous year. Which of the following is equal to the average rate of change of imports per annum?
- (1) 10% (2) 10.7% (3) 22.6%
- (4)  $[(0.2)(-0.18)(0.3)]^{\frac{1}{3}}$  (5)  $[(100 + 20)(100 - 18)(100 + 30)]^{\frac{1}{3}} - 100$
6. If the mid values ( $X_i$ ) of class intervals of a frequency distribution were transformed into  $U_i$  values as  $U_i = \frac{X_i - A}{C}$ , which of the following gives the mean  $\bar{X}$  and the standard deviation  $\sigma$  of the distribution respectively?
- (1)  $\bar{X} = A + \bar{U}, \sigma_x = C\sigma_u$  (2)  $\bar{X} = A + C\bar{U}, \sigma_x = C\sigma_u$
- (3)  $\bar{X} = A - C\bar{U}, \sigma_x = C\sigma_u$  (4)  $\bar{X} = \bar{U}, \sigma_x = C\sigma_u$
- (5)  $\bar{X} = A + C\bar{U}, \sigma_x = \sigma_u$
7. In a moderately skewed distribution, the mode and the mean are 32 and 35 respectively. What is the median of the distribution?
- (1) 32 (2) 33 (3) 34 (4) 35 (5) 36
8. For a certain distribution, Kelly's coefficient of skewness is 0.2 and  $P_{10} = 60$  and median = 80. What is the value of  $P_{90}$  of the distribution?
- (1) 100 (2) 110 (3) 130 (4) 140 (5) 160
9. Which of the following statements is **false**?
- (1) Bowley's co-efficient of skewness cannot be used when a distribution has open end classes.
- (2) Kelly's co-efficient of skewness covers more extreme values than Bowley's co-efficient of skewness.
- (3) The distribution with a negative co-efficient of skewness has a longer tail to the right.
- (4) Bowley's co-efficient of skewness is based on only the central 50% of the observations.
- (5) In a distribution with a longer tail to the right, mean > median > mode.
10. The means of runs scored by the five batsmen A, B, C, D and E in a series of 10 innings are 75, 60, 50, 45 and 20 respectively. The standard deviations of their runs are 30, 25, 30, 15, 10 respectively. Who is the most consistent batsman of the five batsmen?
- (1) A (2) B (3) C (4) D (5) E
11. A motor car travels 250 km with the speed of 50 km/hour, 120 km with the speed of 40 km/hour and the remaining 50 km with the speed of 25 km/hour. Which of the following is equal to average speed of the motor car for the entire trip?
- (1)  $38\frac{1}{3} \text{ km h}^{-1}$  (2)  $42 \text{ km h}^{-1}$  (3)  $63\frac{2}{3} \text{ km h}^{-1}$
- (4)  $140 \text{ km h}^{-1}$  (5)  $(50 \times 40 \times 25)^{\frac{1}{3}} \text{ km h}^{-1}$
12. Consider the following data set.  
14, 15, 8, 10, 13, 18, 9, 11, 7, 16, 19, 22, 21  
Select the correct answer which gives the first quartile, second quartile, and the third quartile of this data set respectively.
- (1) 8, 9, 16 (2) 9.5, 14, 18.5 (3) 9, 14, 18 (4) 8.5, 9.5, 16.5 (5) 10, 15, 19
13. Which of the following statements is true about regression and correlation?
- (1) If a constant is subtracted from the two variables X and Y, the correlation co-efficient between X and Y will also change accordingly.
- (2) If correlation co-efficient between X and Y is zero, we can conclude that there is no relationship between X and Y.
- (3) The correlation co-efficient is only a measure of linear relationship between X and Y.
- (4) The free hand method can also be used to fit a multiple regression model.
- (5) If the regression co-efficient of Y on X is  $b_1$  and the regression co-efficient of X on Y is  $b_2$  then the correlation co-efficient between X and Y is  $b_1b_2$ .

14. Consider the following statements regarding the regression analysis.

- A - If the regression co-efficient of  $Y$  on  $X$  is positive, the correlation co-efficient between  $X$  and  $Y$  is also positive.  
 B - The co-efficient of determination is equal to the square of the correlation co-efficient in simple linear regression.  
 C - A multiple regression model can have only two independent variables.

Of the above statements,

- (1) only  $B$  is true. (2) only  $A$  and  $B$  are true.  
 (3) only  $A$  and  $C$  are true. (4) only  $B$  and  $C$  are true.  
 (5) all  $A$ ,  $B$  and  $C$  are true.

15. If the yield increases by 12 kg when the fertilizer increases by 5 kg according to a fitted regression line, what is the regression co-efficient?

- (1) 0.42 (2) 2.4 (3) 5 (4) 7 (5) 10

16. Consider the following statements about the approaches to probability.

- A - For the probability of a certain event, every person gets the same answer as the correct answer under classical approach to probability.  
 B - If the number of all possible outcomes of an experiment is  $n$  and the number of outcomes favourable to the event  $A$  is  $m$ , the probability of the event  $A$  occurs is  $P(A) = \frac{m}{n}$ .  
 C - Under the mathematical approach to probability, it is not required that the probability of the sample space  $P(S) = 1$ .

Of the above statements,

- (1) only  $A$  is true. (2) only  $A$  and  $B$  are true.  
 (3) only  $A$  and  $C$  are true. (4) only  $B$  and  $C$  are true.  
 (5) all  $A$ ,  $B$  and  $C$  are true.

17. The sample space for a certain random experiment is  $S = \{a_1, a_2, a_3, a_4\}$ . The Probability function for the given sample space is

- (1)  $P(a_1) = \frac{1}{2}, P(a_2) = \frac{1}{2}, P(a_3) = -\frac{1}{4}, P(a_4) = \frac{1}{5}$ .  
 (2)  $P(a_1) = \frac{1}{2}, P(a_2) = \frac{1}{4}, P(a_3) = -\frac{1}{4}, P(a_4) = \frac{1}{2}$ .  
 (3)  $P(a_1) = \frac{3}{2}, P(a_2) = \frac{1}{4}, P(a_3) = \frac{1}{8}, P(a_4) = \frac{1}{8}$ .  
 (4)  $P(a_1) = \frac{1}{2}, P(a_2) = 0, P(a_3) = \frac{1}{4}, P(a_4) = \frac{1}{4}$ .  
 (5)  $P(a_1) = \frac{1}{4}, P(a_2) = \frac{1}{5}, P(a_3) = \frac{1}{5}, P(a_4) = \frac{1}{4}$ .

18. If  $A$  and  $B$  are any two events with  $P(A) = P_1, P(B) = P_2$  and  $P(A \cap B) = P_3$  then the probability of the event  $A \cup (A' \cap B)$  is

- (1)  $P_1 + P_2 - P_3$ . (2)  $P_2 - P_3$ . (3)  $P_1 - P_3$ .  
 (4)  $1 - P_1 - P_2 + P_3$ . (5)  $1 - P_3$ .

19. If  $A$  and  $B$  are two events with  $P(A \cap B) = \frac{1}{2}, P(A' \cap B') = \frac{1}{3}$  and  $P(A) = P(B) = k$  then the value of  $k$  is,

- (1)  $\frac{1}{3}$ . (2)  $\frac{1}{2}$ . (3)  $\frac{7}{8}$ . (4)  $\frac{8}{9}$ . (5)  $\frac{7}{12}$ .

20. If  $A, B$  and  $C$  are any three events, which of the following expressions gives the probability that  $A$  or  $B$  occur but **not**  $C$  occurs?

- (1)  $P(A \cap B \cap C')$  (2)  $P[(A \cup B) \cap C']$   
 (3)  $P[(A' \cap C') \cup (B' \cap C')]$  (4)  $1 - P[(A \cup B) \cap C']$   
 (5)  $P[(A' \cup B') \cap C]$

21. The random variable  $X$  has the following probability distribution.

|        |     |     |     |      |     |     |
|--------|-----|-----|-----|------|-----|-----|
| $x$    | 0   | 1   | 2   | 3    | 4   | 5   |
| $f(x)$ | 0.1 | $K$ | 0.2 | $2K$ | 0.3 | $K$ |

- Which could be the smallest value of  $X$  for  $P(X \leq x) > 0.5$ ?
- (1) 1.0                      (2) 2.0                      (3) 2.5                      (4) 3.0                      (5) 4.0
22. If a random variable  $X$  has a poisson distribution with  $P(X = 1) = P(X = 2)$  then what is the value of  $P(X > 0)$ ?
- (1) 0.1353                      (2) 0.3879                      (3) 0.4060                      (4) 0.5940                      (5) 0.8647
23. If a male birth or a female birth are equally likely, what is the probability that there are fewer girls than boys in a family of 5 children?
- (1) 0.0313                      (2) 0.1583                      (3) 0.1876                      (4) 0.5001                      (5) 0.8126
24. The marks of a certain examination are in a normal distribution with mean 76 and standard deviation 15. If the best 15% of the students are awarded A passes, what is the approximately minimum mark to receive an A pass?
- (1) 77                      (2) 85                      (3) 91                      (4) 92                      (5) 94
25. 2.5% of the items produced by a certain factory is defective. If a random sample of 100 items is selected from these items, the probability that at most one item is defective is
- (1) 0.0821.                      (2) 0.2052.                      (3) 0.2873.                      (4) 0.7127.                      (5) 0.9179.
26. Consider the following statements about the systematic sampling.
- A - If the units in the sampling frame are in a random order we can expect that precision of the systematic sampling is same as the precision of the simple random sampling.
- B - Systematic sampling can be considered as a cluster sampling with the selection of one cluster from  $k$  clusters of size  $n$ .
- C - In systematic sampling,  $\frac{N}{n}$  is called the sampling fraction.
- Of the above statements,
- (1) only A is true.                      (2) only A and B are true.  
 (3) only A and C are true.                      (4) only B and C are true.  
 (5) all A, B and C are true.
27. Which of the following statements is true about sampling?
- (1) If the sampling fraction is large, the finite population correction can be ignored.  
 (2) If the variations among clusters are large, cluster sampling is more efficient.  
 (3) Quota sampling can be considered as a non-probability stratified sampling.  
 (4) Cluster sampling is not used when there is no sampling frame.  
 (5) The method of selecting a sample giving a known probability to every unit of the population is called simple random sampling.
28. In simple random sampling without replacement, which of the following gives the probability that a certain specified unit of the population is included in the sample?
- (1)  $\frac{1}{N}$                       (2)  $\frac{n}{N}$                       (3)  $\frac{n-1}{N}$                       (4)  $\frac{1}{NC_n}$                       (5)  $\frac{1}{N^n}$
29. According to the central limit theorem, the sampling distribution of the sample proportion  $p$  is
- (1) normal for large samples.  
 (2) normal if the population proportion is  $\pi = 0.5$ .  
 (3) approximately normal if the population size is large.  
 (4) approximately normal if the sample size is large.  
 (5) approximately normal only if the population is infinite.

- 5 -

30. Which of the following statements is true?
- (1) The accuracy of an estimate is measured by its standard error.
  - (2)  $\bar{X} - \mu$  is always a statistic since it is a function of the sample elements.
  - (3) The standard error of the mean of a sample from a finite population is larger than the standard error of the mean of a sample from an infinite population for the same sample size.
  - (4) Chi-square distribution is skewed to the left.
  - (5) The shape of the T-distribution depends only on the sample size.
31. It is required to estimate the population mean  $\mu$  by the sample mean  $\bar{X}$  of a random sample taken from the population  $N(\mu, 100)$ . What is the sample size 'n' required for estimating population mean  $\mu$ , within the range  $\mu \pm 5$  with probability 0.954?
- (1) 4
  - (2) 11
  - (3) 15
  - (4) 16
  - (5) 80
32. In a random sample of size 16 from a normal population with mean  $\mu$  and variance  $\sigma^2 = 25$ , the sample mean was  $\bar{X} = 75$  and the sample variance was  $s^2 = 16$ . The best 95% confidence interval for  $\mu$  is
- (1) (73.04, 76.96)
  - (2) (72.55, 77.45)
  - (3) (72.33, 77.67)
  - (4) (72.87, 77.13)
  - (5) (71.94, 78.06)
33. Consider the following statements about confidence intervals.
- A - If the sample size is small the confidence interval for the mean  $\mu$  of a normal distribution based on the  $t$ -distribution is wider than the confidence interval based on  $z$ -distribution.
- B - One way of reducing the width of a confidence interval for a given confidence level is to increase the sample size.
- C - The meaning of the 95% confidence interval for population mean  $\mu$  is that the variable  $\mu$  lies in the interval with probability 0.95.
- Of the above statements,
- (1) only A is true.
  - (2) only B is true.
  - (3) only A and B are true.
  - (4) only B and C are true.
  - (5) all A, B and C are true.
34. Which of the following statements is false?
- (1) If the mean of a normal population with unknown variance is  $\mu$ ,  $H_0 : \mu = 100$  is a composite hypothesis.
  - (2) If the  $p$ -value of a hypothesis test is high the null hypothesis is more credible.
  - (3) The value of a test statistic is calculated under the assumption that the null hypothesis is true.
  - (4) The probability that the  $H_1$  hypothesis is accepted when  $H_1$  is true is called the power of the test.
  - (5) A better hypothesis test can be performed by reducing the significance level.
35. The mean of a random sample of size 45 from distribution  $N(\mu_1, 90)$  is 920 and the mean of a random sample of size 50 from  $N(\mu_2, 100)$  distribution is 925. When testing hypothesis  $H_0 : \mu_1 = \mu_2$  against  $H_1 : \mu_1 < \mu_2$  at 5% significance level, the conclusion is
- (1) reject  $H_0$  : since  $p$ -value = 0.0062 < 0.05
  - (2) do not reject  $H_0$  : since  $p$ -value = 0.0062 < 0.05
  - (3) reject  $H_0$  : since  $p$ -value = 0.0124 < 0.05
  - (4) do not reject  $H_0$  : since  $p$ -value = 0.0124 < 0.05
  - (5) reject  $H_0$  : since  $p$ -value = 0.0124 < 1.64
36. The critical region for testing the hypothesis  $H_0 : \mu = 62$  against  $H_1 : \mu = 63$  by taking a random sample of size 30 from  $N(\mu, 120)$  population is given by  $\bar{X} > 64$ . The probability of type I error for this hypothesis test is
- (1) 0.1587.
  - (2) 0.1915.
  - (3) 0.3085.
  - (4) 0.3413.
  - (5) 0.6587.



37. A candidate in a local electoral area claims that at least 50% of the voters will vote for him. To test his claim a random sample of 100 voters was selected and 48 voters said that they would vote for him. The candidate's claim cannot be rejected at 5% significance level since,

- (1)  $z = -0.4 > -1.64$  (2)  $z = 0.4 < 1.64$   
 (3)  $z = -0.39 > -1.64$  (4)  $z = 0.39 < 1.64$   
 (5)  $-1.96 < z = -0.4 < 1.96$

38. The number of errors in 100 accounts selected at random from a company are given below.

| Number of Errors   | 0  | 1  | 2  | 3 | 4 | 5 | 6 |
|--------------------|----|----|----|---|---|---|---|
| Number of Accounts | 40 | 35 | 19 | 2 | 0 | 2 | 2 |

What is the table (critical value) value of the Chi-square distribution in testing goodness of fit at 5% level of the poisson distribution fitted for this distribution?

- (1) 5.99 (2) 7.81 (3) 9.49 (4) 11.1 (5) 12.6
39. The incomplete analysis of variance table constructed to compare mean output of three machines is given below.

| Analysis of variance table |     |     |     |     |
|----------------------------|-----|-----|-----|-----|
| Source                     | SS  | df  | MS  | F   |
| Between samples            | $a$ | 2   | 65  | $d$ |
| Within samples             | 96  | 12  | $c$ |     |
| Total Variation            | 226 | $b$ |     |     |

Select the statement which gives the correct values for  $a, b, c, d$  respectively.

- (1)  $a = 130, b = 10, c = 8, d = 8.125$   
 (2)  $a = 322, b = 14, c = 8, d = 8.125$   
 (3)  $a = 130, b = 24, c = 84, d = 0.773$   
 (4)  $a = 130, b = 14, c = 8, d = 8.125$   
 (5)  $a = 130, b = 10, c = 8, d = 0.123$
40. Consider the following statements about time series analysis.
- A - Method of semi-average can be used only when the trend is linear.  
 B - The multiplicative model of time series assumes that the components caused due to various factors affect each other.  
 C - In moving average method, it is assumed that the trend varies according to a line.
- Of the above statements,
- (1) only A is true. (2) only B is true.  
 (3) only A and B are true. (4) only A and C are true.  
 (5) all A, B and C are true.
41. The trend equation with the origin 2006 is given by  $Y_t = 56 - 4t$ . Time unit = 1 year. If the origin is shifted from 2006 to 2002 what is the new trend equation?
- (1)  $Y_t = 56 - t$  (2)  $Y_t = 40 - 4t$  (3)  $Y_t = 76 - 4t$   
 (4)  $Y_t = 72 - 4t$  (5)  $Y_t = 72 + 4t$
42. In a certain shop the seasonal index for the garment sales is 80 for the first quarter and 130 for the fourth quarter. If the value of the total sales for the first quarter is Rs. 100 000, what is the sales value of the garments that the shop should keep for the fourth quarter in order to meet the demand?
- (1) Rs. 61 530 (2) Rs. 130 000 (3) Rs. 162 500 (4) Rs. 500 000 (5) Rs. 800 000
43. The moving average of order 3 of the values 15, 24, 21, 33 and 42 are given by
- (1) 20, 22, 30 (2) 20, 26, 32 (3) 20, 23, 32 (4) 20, 24, 33 (5) 20, 25, 34

- 7 -

44. The statistical chart constructed to control the number of defects per unit of a product is  
 (1)  $nP$  - chart. (2)  $P$  - chart. (3)  $C$  - chart. (4)  $\bar{X}$  - chart. (5)  $R$  - chart.
45. The average number of defectives in 10 samples each of the size 100 was found to be  $\bar{P} = 0.20$ . The Lower control limit (L.C.L.) and Upper Control Limit (U.C.L.) of the  $P$  - chart respectively are  
 (1) (0.16, 0.24). (2) (0.18, 0.28). (3) (0.20, 0.32). (4) (0.08, 0.32). (5) (0.08, 0.20).
46. Consider the following statements.  
 A - Rejecting a good lot is called producer's risk.  
 B - The maximum allowable number of defectives in the sample in acceptance sampling is called acceptance number.  
 C - The quality level of a bad lot is called the Acceptable Quality Level.  
 Of the above statements,  
 (1) only A is true. (2) only B is true.  
 (3) only A and B are true. (4) only A and C are true.  
 (5) all A, B and C are true.
47. For an acceptance sampling plan with  $N = 1200$ ,  $n = 100$  and  $C = 1$ , what is the probability of acceptance of a lot with fraction defective for 4%?  
 (1) 0.0183 (2) 0.0733 (3) 0.0916 (4) 0.9084 (5) 0.9817
48. A worker earned Rs.30 000 per month in year 2005. The cost of living index increased by 25% in the year 2010 compared to 2005. What should be the salary of the worker in 2010, if his standard of living is to remain the same as in 2005?  
 (1) Rs.32 000 (2) Rs.35 000 (3) Rs.37 500 (4) Rs.75 000 (5) Rs.120 000
49. The price index numbers for the years 2003-2010 are given in the following table. (Base year = 1998).
- |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|
| 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 140  | 200  | 210  | 230  | 250  | 260  | 280  | 300  |
- Select the correct answer which gives the new index numbers for 2004 and 2010 respectively, if the base year is shifted from 1998 to 2007.  
 (1) 70, 110 (2) 80, 120 (3) 85, 125 (4) 90, 130 (5) 125, 83
50. In a situation where prices are increasing, the index that tends to overestimate the price increase is  
 (1) Laspeyre's price index. (2) Paache's price index.  
 (3) Marshall - Edgeworth price index. (4) Fisher's price index.  
 (5) Simple aggregate price index.

\* \* \*