

Total Number of Questions : 21

Time : 2.00 Hours

Max. Marks : 100

1. What are the salient features of the 73<sup>rd</sup> Constitutional Amendment Act in India ? (4 Marks)
2. Explain the Three-Tier Governance of Panchayati Raj System in India and explain the functions of each layer of government. (4 Marks)
3. What is meant by fiscal decentralisation ? Explain the major roles of State Finance Commission (SFC). (4 Marks)
4. What is Grama Sabha ? Explain the composition and functions of Grama Sabha. (4 Marks)
5. Describe the sources of financing the plans at Grama Panchayat level. (4 Marks)
6. What is 'social audit' ? Explain the objectives and significance of social auditing. (5 Marks)
7. If  $\underline{X} \sim N_p(Q, I)$ , find the characteristic function of  $\underline{Y} = \underline{X}' A \underline{X}$ , where A is any real matrix of order  $p \times p$ . (5 Marks)
8. If state k is persistent null, then for every j  $\lim_{n \rightarrow \infty} p_{jk}^{(n)} \rightarrow 0$  and if state k is aperiodic, persistent non-null, then prove that  $\lim_{n \rightarrow \infty} p_{jk}^{(n)} \rightarrow \frac{F_{jk}}{\mu_{kk}}$ . (5 Marks)
9. Let  $X_1, X_2, \dots, X_n$  are random sample of size n taken from Poisson distribution with parameter  $\lambda$ . Find the UMVUE of  $e^{-\lambda}$ . (5 Marks)
10. Suppose a random sample of size n taken from the Poisson distribution with parameter  $\lambda$ . Find the most powerful critical region of size  $\alpha$  for testing  $H_0 : \lambda = \lambda_0$  against the alternative  $H_1 : \lambda = \lambda_1$ , where  $\lambda_1 > \lambda_0$ . (5 Marks)
11. Show that in simple random sampling without replacement "The probability of selecting a specified unit of the population at any given draw is equal to the probability of it being selected at the first draw". (5 Marks)
12. "Planning premises are the anticipated environment in which plans are expected to operate". Explain this statement by clearly defining the purpose of establishing planning premises. Also list the various external premises in this context. (5 Marks)
13. "Planned change requires change agents" discuss. Also describe the roles of change agents in implementing organizational change. (5 Marks)
14. "Planning is the basis and action is the essence of Controlling". Discuss. (5 Marks)
15. Explain the role of Prof. P. C. Mahalanobis as the architect of Indian Economic Planning. (5 Marks)

16. Describe the role of NITI Aayog in economic planning. (5 Marks)
17. Find a basis of  $\mathbb{R}^3$  with respect to which the matrix of the linear map  $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$  defined by  $T(x, y, z) = (5x - 6y - 6z, -x + 4y + 2z, 3x - 6y - 4z)$  is diagonal. (5 Marks)
18. Examine whether the series  $\sum \left[ \frac{x^{2n+1}}{2n+1} - \frac{x^{n+1}}{2n+2} \right]$  is uniformly convergent on  $(0, 1)$ .  
Justify your answer. (5 Marks)
19. A mass of 20 kg attached to a spring with spring constant  $320 \text{ Nm}^{-1}$  and brought to rest. Find the position of the mass at time  $t = \frac{\pi}{2}$  if a force equal to  $40 \cos 2t$  is applied to it. (5 Marks)
20. Use dynamic programming techniques to solve the following problem : Minimize  $z = y_1^2 + y_2^2 + y_3^2$  subject to  $y_1 + y_2 + y_3 \geq 15$  and  $y_1, y_2, y_3 \geq 0$ . (5 Marks)
21. Find the spectrum of the operator  $A : l^2 \rightarrow l^2$  defined by  $A(x_1, x_2, x_3, \dots) = \left( x_1, \frac{x_2}{2}, \frac{x_3}{3}, \dots \right)$ . (5 Marks)
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