Total Number of Questions : 20

Time : 2.00 Hours

Max. Marks : 100

1. Explain the importance of science and technology in Rural Development. **(4 Marks)**

2. As a teacher, explain how you will integrate ICT in the classrooms. (any 4 methods) **(4 Marks)**

3. Mental health and well-being activities for teachers should be ongoing and holistic. Substantiate. **(4 Marks)**

4. How technology integration in education helped to enhance quality performance of students ? **(4 Marks)**

5. What do you mean by research ethics ? What are the ethical issues in educational research ? **(4 Marks)**

6. Briefly examine the forms of community engagement. **(6 Marks)**

7. Mention any four reasons to state that ICT plays an important role in the assessment of learner. Briefly explain any four softwares that can be used to develop quizzes in ICT based classroom. **(6 Marks)**

8. Explain the relationship between education and social change and the functions of education in social change. **(6 Marks)**

9. Justify the role of research and innovations in improving classroom teaching of teachers. **(6 Marks)**

10. What do you mean by 'Criticism of Data' in historical research ? Differentiate 'External Criticism' from 'Internal Criticism' ? **(6 Marks)**

11. For a quantum system of two identical particles, each of which can be in one of 'n' quantum states, find no. of symmetric states of the system. **(3 Marks)**

12. Among the following interactions, which ones are allowed ? Which ones are forbidden ? Explain why ? **(3 Marks)**

    a) $\pi^- + p \rightarrow K^- + \Sigma^+$

    b) $\pi^+ + p \rightarrow K^0 + \Sigma^+$

    c) $\pi^- + p \rightarrow \Xi^- + \kappa^+ + K^0$

    d) $\wedge \rightarrow \Sigma^- + \pi^+$

    e) $K^- + p \rightarrow K^0 + n$

    f) $\pi^+ + p \rightarrow \wedge + K^+ + \pi^+$

13. ϕ_1 and ϕ_2 are normalised eigen functions corresponding to the same eigen value. If $\int \phi_1^* \phi_2 \, d\tau = d$, where d is real, find normalised linear combinations of ϕ_1 and ϕ_2 that are orthogonal to a) ϕ_1, b) $\phi_1 + \phi_2$. **(4 Marks)**

14. A deuteron gas is heated at temperature T. For which temperature nuclear process occur ? Which is the interaction involved ? **(4 Marks)**

15. A rigid wheel has principal moments of inertia. $I_1 = I_2 \neq I_3$ about its body fixed principal axes $\hat{x}, \hat{y}$ and $\hat{z}$. The wheel is attached at its centre of mass to a bearing which allows frictionless rotation about one space-fixed axis. The wheel can rotate at constant $\vec{\omega} \neq 0$ and exert no torque on its bearing. What conditions must the components of $\vec{\omega}$ satisfy? Find $\omega_1, \omega_2, \omega_3$ and hence $|\vec{\omega}|$. (6 Marks)

16. State Residue theorem. Hence evaluate the integral $\oint_C \dfrac{dz}{\sin h\, 2z}$, where 'C' is the circle $|z|=2$, the contour being taken in the positive sense. (6 Marks)

17. The saturation magnetic induction of Nickel is 0.65 wb/m². If the density of nickel is 8906 kg/m³ and its atomic weight is 58.7, calculate the magnetic moment of nickel atom in Bohr magneton. (6 Marks)

18. Find the electric field at a distance 'z' above the centre of a plane circular disc of radius R. Which carries a uniform surface charge σ. What happens to the formula in the limit $R \rightarrow \alpha$? Also express the case $z >> R$. (6 Marks)

19. For the ideal Op Amp shown, what should be the value of resistor R_1 to get a gain of 5? (6 Marks)
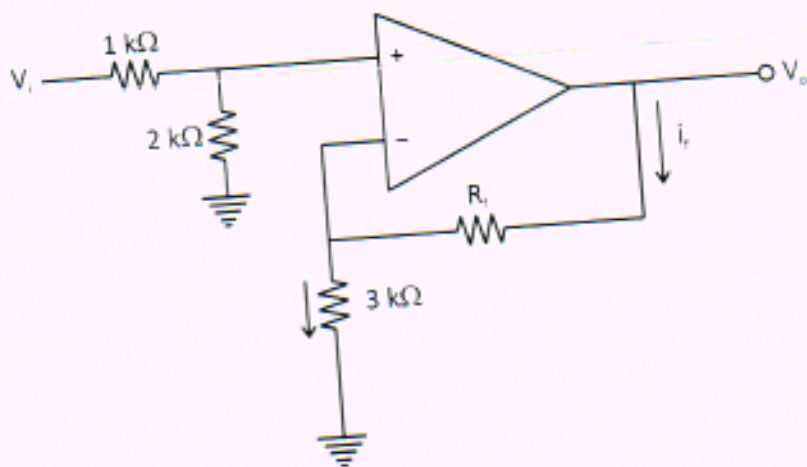
20. The spacing between the lines in the microwave spectrum of $H^{35}Cl$ is 6.350×10^{11} Hz. Find the bond length of $H^{35}Cl$. (6 Marks)