

**K.S ACADEMY, SALEM- CONTACT 8148891005, 9042976707,
9047767620**

K.S ACADEMY, SALEM

PG TRB , POLYTECHNIC TRB, ENG TRB, AEEO TRB TNPS

SCIENTIFIC ASSISTANT & TNSET

TRB COACHING CENTRE FOR PHYSICS

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PG TRB AND POLYTECHNIC TRB 2ND BATCH ADMISSION GOING ON....

PG TRB AND POLYTECHNIC TRB

2nd BATCH DEMO CLASS ON 20 MAY 2018 (SUNDAY)

EFFECTIVENESS OF CLASS WITNESSED ONLY BY

ATTENDING THE CLASS

**WE PROUD TO SAY OUR INSTITUTE QUESTION PAPERS PREPARED BY OWN -
NOT COPIED FROM OTHERS INSTITUTE/ STATE QUESTION PAPERS**

Time: 1 Hour

Marks: 40

Problem based questions for POLYTECHNIC TRB

Answer all the question:

1. A spherical symmetry charge distribution has density $\rho_v = \begin{cases} \rho_0 & 0 \leq r \leq R \\ 0 & r > R \end{cases}$

The value of electric field For $r \gg R$ is

a) $\frac{\rho_0 R^3}{3\epsilon_0 r^2} \hat{a}_r$

b) $\frac{\rho_0 R^3}{3\epsilon_0 r} \hat{a}_r$

c) $\frac{\rho_0 R^2}{3\epsilon_0 r^2} \hat{a}_r$

d) $\frac{\rho_0 R^2}{3\epsilon_0 r} \hat{a}_r$

2. The electric displacement $D = z \cos^2 \theta \hat{k} \frac{c}{m^2}$ then the charge density at

$(1, \pi/4, 3)$ is

a) 11.7 C/m^3

b) 2.86 C/m^3

c) 0.5 C/m^3

d) 100 C/m^3

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3. A parallel-plate capacitor with air between the plates having area of 5 cm^2 and plate separation of 3 mm has a voltage $50 \sin 10^3 t \text{ V}$ applied to its plates. The displacement current is.

- a) $140 \cos 10^3 t \text{ nA}$ b) $113 \cos 10^3 t \text{ nA}$
 c) $50.7 \cos 10^3 t \text{ nA}$ d) $73 \cos 10^3 t \text{ nA}$

4. Match the following

List-I

- A) Average energy density
 B) Average of Poynting vector
 C) Average momentum density
 D) Pointing vector

List-II

- P) $\frac{1}{2} C \epsilon_0 E_0^2$
 Q) $\frac{1}{2} \epsilon_0 E^2$
 R) $\frac{1}{\mu_0} (\vec{E} \times \vec{B})$
 S) $\frac{1}{2c} \epsilon_0 E_0^2$

A

B

C

D

- | | | | | |
|----|---|---|---|---|
| a) | Q | P | S | R |
| b) | S | P | Q | R |
| c) | Q | S | P | R |
| d) | R | S | P | Q |

5. Read assertion and reason carefully, select proper option from given below.

Assertion : When an electromagnetic wave going through vacuum is described as $E = E_0 \sin(\omega t - kx)$ then $\frac{\omega}{k}$ is independent of the wavelength

Reason : $\frac{\omega}{k}$ is speed of the wave.

- a) Both assertion and reason are true and reason explains the assertion.
 b) Both assertion and reason are true but reason does not explain the assertion.
 c) Assertion is true but reason is false.

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d) Assertion is false and reason is true.

6. A plane sheet of charge carries at $y = 1$ plane carries current density

$\vec{k} = 40\hat{a}_z \frac{A}{m}$ the value of \vec{H} at the point $(0, 0, 0)$ is

- a) zero b) $20\hat{a}_x$ c) $40\hat{a}_x$ d) $10\hat{a}_x$

7. A uniform plane wave $\vec{E} = E_0 \cos(\omega t - \beta z)\hat{a}_x$ is propagating in medium. The magnitude and direction of Poynting vector is

- a) $\frac{E_0^2}{n_0} \cos^2(\omega t - \beta z)$, z - direction b) $\frac{E_0^2}{n_0} \sin^2(\omega t - \beta z)$, y - direction
c) $\frac{E_0^2}{n_0} \cos^2(\omega t - \beta z)$, z - direction d) $\frac{E_0^2}{n_0} \cos^2(\omega t - \beta z)$, y - direction

8. If U^{233} nucleus is fissioned by a neutron. The mass of U^{233} , two fission fragments of mass numbers 96 and 136 and neutron are respectively 233.12amu, 95.94 amu, 135.95 amu and 1.009 amu. The amount of energy released is

- a) 54.8 MeV b) 200 MeV c) 177 MeV d) 26.7 MeV

9. According to Proton-Neutron theory

- 1) A free neutron and proton to be contained in the nucleus.
2) The electron does not pre-exist in the nucleus but is formed at the time of emission.

- a) 1 only correct b) 2 only correct
c) 1 & 2 are correct d) none of the above

10. The unsuccessful result of shell model is

a) It explains the existence of magic numbers and the stability and high binding energy

on the basis of closed shells

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b) The spin and parity of ${}_{11}\text{Na}^{23}$ is $I = \frac{5^+}{2}$

c) It provides explanation for the ground state spins and magnetic moments of the nuclei

d) none of the above

11. r_1 and r_2 are the radii of atomic nuclei of mass numbers 64 and 27 respectively. The ratio r_1/r_2 is

a) $4/3$

b) 1

c) $64/27$

d) $27/64$

12. According to the single particle nuclear shell model, the spin parity of the ground state of ${}_{8}^{17}\text{O}$ is

a) $\frac{4^+}{3}$

b) $\frac{1^+}{2}$

c) $\frac{1^-}{2}$

d) $\frac{5^+}{2}$

13. According to baryon law of conservation not allowed reaction is

a) $\lambda + n \rightarrow p + n + \pi^0$

b) $p + n \rightarrow p + n + \vartheta$

c) $\pi^- \rightarrow \mu^- + \vartheta_\mu$

d) $p + n \rightarrow e^+ + \vartheta$

14. The Hamiltonian for the inverse square orbit problem is $H = \frac{1}{2}m(\dot{r}^2 + r^2\dot{\theta}^2) - \frac{mMG}{r}$ the value of \dot{P}_θ is

a) $\frac{P_\theta^2}{mr^3} - \frac{mMG}{r^2}$

b) P_r/m

c) 0

d) P_θ/mr^2

15. The Lagrangian for the motion of the masses of Atwood machine is given by

a) $\frac{1}{2}(m_1 + m_2 + \frac{1}{R^2})\dot{x}^2$

b) $\frac{1}{2}(m_1 + m_2)\dot{x}^2 + m_1gx + m_2g(L - x)$

c) $\frac{1}{2}I\dot{\theta}^2 + m_1gx - m_2g(L - x)$

d) $\ddot{\theta} = -gx$

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16. If P is momentum of the particle of rest mass m and energy E then its kinetic energy is

- a) $\sqrt{P^2 C^2 + m^2 C^4}$ b) mC^2
 c) $\frac{P^2}{2m}$ d) $\sqrt{P^2 C^2 + m^2 C^4} - mC^2$

17. The degree of freedom of a vibrating string

- a) 2 b) 3 c) 6 d) infinity

18 .If the Lagrangian of a particle moving in one dimension is $L = \frac{m\dot{x}^2}{2} - V(x)$, the Hamiltonian is

- a) $\frac{p^2}{2x} + V(x)$ b) $\frac{x^2}{2p} + V(x)$
 c) $\frac{1}{2}xP^2 - V(x)$ d) $\frac{p^2}{2m} + V(x)$

19. Choose the correct answer for the given Lagrangian $L = \frac{1}{2}m(\dot{x}^2 + \dot{y}^2) - mgy$

- a) x is cyclic co-ordinate, P_x is constant but energy E is not constant
 b) y is cyclic, P_y is constant and E is also constant
 c) Both P_x and P_y are constant and therefore the energy is also constant
 d) Both P_x and E are constant and x is cyclic co ordinate

20. Which of the following is wrong

- i) Moving rods contract along the direction of motion.
 ii) Maxwell's equations for the propagation of electromagnetic waves are Lorentz invariant.
 iii) A metre rod travels with a speed $v = 0.8c$ along its length, its change in length is 0.6m.
 iv) If the Poisson bracket $\{x, p\} = 1$ then the Poisson bracket $\{x^2 + p, p\}$ is $2x$.
- a) i & ii b) ii & iii
 c) iii only d) iii & iv

Answer At Last Page

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OUR INSTITUTE RESULTS

EXAM	NO OF CANDIDATE SELECTED
PG TRB 2013	2 (100%)
PG TRB 2014	6 (86%)
TNSET 2016	5 (71%)
PG TRB 2017	26 (74%)
TNSET 2017	WE EXPECT -12

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ATTENDING THE CLASS

20.5.2018 முதல் வகுப்புகள் ஆரம்பம்

K .S ACADEMY

(Exclusively for PHYSICS)

(சுப்பீரியர் அகாடமி)

டவுன் ரயில்வே ஸ்டேஷன் அருகில்

சேலம்-1

Answer key

Q.NO	ANS	Q.NO	ANS
1	C	11	C
2	D	12	D
3	D	13	C
4	C	14	B
5	B	15	A
6	B	16	A
7	C	17	A
8	C	18	B
9	B	19	C
10	D	20	B