Unit 3 - Week 1

Course outline

Assignment 1

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-08-14, 23:59 IST.

Lecture -1 (Subscript notations –I)

1) The number of free subscripts in A_{ijkl} is/are *1 point*

- 1
- 2
- 3
- 4

No, the answer is incorrect.
Score: 0
Accepted Answers:
4

2) The maximum number of components possible for A_{ijkl} are *1 point*

- 27
- 81
- 9
- 4

No, the answer is incorrect.
Score: 0
Accepted Answers:
81

3) $\frac{\partial p}{\partial x_i}$ can be written in subscript notation as, *1 point*

- p_i
- p_{ii}
- $p_{,i}$
- $p_{i,}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$p_{,i}$

4) The tensorial order of the quantity $S_{ijkl}\delta_{ij}$ is *1 point*

- 1
- 2
- 3
- 6

No, the answer is incorrect.
Score: 0
Accepted Answers:
2

5) Consider $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 & 0 \\ 0 & 7 & 0 \\ 0 & 0 & 8 \end{bmatrix}$.If $C_{ij} = A_{ik}B_{kj}$, find $\delta_{ij}C_{ij}$................

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 58

1 point

6) Consider $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 5 & 6 & 0 \\ 0 & 7 & 0 \\ 0 & 0 & 8 \end{bmatrix}$.If $C_{ij} = A_{ik}B_{kj}$, find C_{21}................

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 0

1 point

7) if $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{b} = 4\hat{i} + 5\hat{j} + 6\hat{k}$ are 2 vectors, then the dyadic product $\vec{a} \otimes \vec{b}$ is given by *1 point*

- $\begin{bmatrix} 4 & 5 & 6 \\ 8 & 10 & 12 \\ 12 & 15 & 18 \end{bmatrix}$
- $\begin{bmatrix} 4 & 8 & 12 \\ 5 & 10 & 15 \\ 6 & 12 & 18 \end{bmatrix}$
- 32
- $\begin{bmatrix} -3 & 6 & -3 \end{bmatrix}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\begin{bmatrix} 4 & 5 & 6 \\ 8 & 10 & 12 \\ 12 & 15 & 18 \end{bmatrix}$

8) if $a_i = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$ and $b_j = \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}$,then the inner product given by $a_i b_i$ =.......

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 32

1 point

Lecture -2 (Subscript notation II):

9) Levi-Civita symbol is written as ϵ_{ijk} . Which of the following expressions are true. *1 point*
$i.\ \epsilon_{123} + \epsilon_{231} + \epsilon_{312} = 3$
$ii.\ \epsilon_{321} + \epsilon_{312} + \epsilon_{322} = 0$
$iii.\ \epsilon_{111} + \epsilon_{222} + \epsilon_{333} = 3$

- i,ii
- ii,iii
- i,iii
- i

No, the answer is incorrect.
Score: 0
Accepted Answers:
i,ii

10) Using subscript notations,find $(\vec{f} \times \vec{g}).(\vec{f} \times \vec{g}) =$ *1 point*

- $(\vec{f}.\vec{g})\vec{g} - (\vec{g}.\vec{f})\vec{f}$
- $(\vec{f} \times \vec{f})\vec{g} - (\vec{g} \times \vec{g})\vec{f}$
- $(\vec{f}.\vec{g})^2 - |f|^2|g|^2$
- $|f|^2|g|^2 - (\vec{f}.\vec{g})^2$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$|f|^2|g|^2 - (\vec{f}.\vec{g})^2$

11) if $\vec{B} = \mu\vec{H}$ and $\vec{B} = \vec{\nabla} \times \vec{A}$,then find $\vec{\nabla} \times \vec{H}$ in terms of $\vec{A}$, *1 point*

- $\frac{1}{\mu}\left(\nabla(\nabla.\vec{A}) - \nabla^2\vec{A}\right)$
- $\frac{1}{\mu}\left(\nabla^2\vec{A} - \nabla(\nabla.\vec{A})\right)$
- 0
- $\frac{1}{\mu}\left((\nabla.\vec{A})\vec{A} - \nabla(\nabla.\vec{A})\right)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{1}{\mu}\left(\nabla(\nabla.\vec{A}) - \nabla^2\vec{A}\right)$

12) if ψ and φ are scalar fields, then $\nabla^2(\varphi\psi)$ is given by *1 point*

- $\varphi(\vec{\nabla}\psi) + \psi(\vec{\nabla}\varphi)$
- $\varphi(\nabla^2\psi) + \psi(\nabla^2\varphi) + 2\vec{\nabla}\psi.\vec{\nabla}\varphi$
- $\varphi(\nabla^2\psi) + \psi(\nabla^2\varphi)$
- $\varphi(\nabla^2\psi) + \psi(\nabla^2\varphi) + 2\vec{\nabla}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\varphi(\nabla^2\psi) + \psi(\nabla^2\varphi) + 2\vec{\nabla}\psi.\vec{\nabla}\varphi$

13) The relationship between Levi-civita symbol and Kronecker delta is given by $\epsilon_{ijk}\epsilon_{lmn} = \begin{vmatrix} \delta_{il} & \delta_{im} & \delta_{in} \\ \delta_{jl} & \delta_{jm} & \delta_{jn} \\ \delta_{kl} & \delta_{km} & \delta_{kn} \end{vmatrix}$ The expression for $\epsilon_{ijk}\epsilon_{imn}$ is given as *1 point*

(Hint : Substitute l=i)

- $\delta_{jm}\delta_{kn} - \delta_{km}\delta_{jn}$
- $\delta_{km}\delta_{jn} - \delta_{jm}\delta_{kn}$
- $2\delta_{kn}$
- $\delta_{jm}\delta_{in} - \delta_{im}\delta_{jn}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\delta_{jm}\delta_{kn} - \delta_{km}\delta_{jn}$

14) The relationship between Levi-civita symbol and Kronecker delta is given by $\epsilon_{ijk}\epsilon_{lmn} = \begin{vmatrix} \delta_{il} & \delta_{im} & \delta_{in} \\ \delta_{jl} & \delta_{jm} & \delta_{jn} \\ \delta_{kl} & \delta_{km} & \delta_{kn} \end{vmatrix}$ Find the value of $\epsilon_{ijk}\epsilon_{ijn}$ *1 point*

- $\delta_{jk}\delta_{in} - 9$
- $2\delta_{kn}$
- $-2\delta_{kn}$
- $2\delta_{kn} - \delta_{jk}\delta_{in}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$2\delta_{kn}$

Lecture -3 (Co-ordinate transformations)

15) A tensor $[D] = \begin{bmatrix} 6 & 6 & 4 \\ 7 & 2 & 8 \\ 1 & 3 & 3 \end{bmatrix}$ where it is arbitrarily rotated about an axis to get $[D'] = \begin{bmatrix} 3 & 1 & 9 \\ q & p & 6 \\ 8 & 7 & 2 \end{bmatrix}$. Find the value of p. *1 point*

- 3
- 5
- 6
- 7

No, the answer is incorrect.
Score: 0
Accepted Answers:
6

16) If a vector is rotated 'θ' degrees counter-clockwise direction around z- axis,then the relation between 'θ' and transformation matrix **'T'** is given by *1 point*

- $\theta = \cos^{-1}\left(\frac{1}{2}Trace(T)\right)$
- $\theta = \cos^{-1}\left(\frac{Trace(T)-1}{2}\right)$
- $\theta = \frac{1}{2}\cos^{-1}\left(Trace(T)\right)$
- $\theta = \frac{1}{2}\cos^{-1}\left(Trace(T) - 1\right)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\theta = \cos^{-1}\left(\frac{Trace(T)-1}{2}\right)$

17) If a vector is rotated **'90 '**degrees counter-clockwise direction around z-axis, the T_{11} of transformation matrix will be *1 point*

- 0
- 1
- 90
- 0.707

No, the answer is incorrect.
Score: 0
Accepted Answers:
0

18) If a vector $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ is rotated 45° counter-clockwise direction around z-axis, the resultant vector obtained is *1 point*

- $\sqrt{2}\,\hat{\jmath} + \hat{k}$
- $\sqrt{2}\,\hat{\imath} + \hat{k}$
- $\hat{\jmath} + \sqrt{2}\,\hat{k}$
- $\sqrt{2}\,\hat{\imath} + \hat{\jmath}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\sqrt{2}\,\hat{\jmath} + \hat{k}$

19) If **'T'** is the transformation matrix under rotation, which of the following statements are true. *1 point*

i. Det(T)=1
ii. Inverse(T)= Transpose (T)
iii. Trace(T) is an invariant

- i,ii
- i,iii
- iii
- i,ii,iii

No, the answer is incorrect.
Score: 0
Accepted Answers:
i,ii,iii

20) Match the following. *1 point*

A. Right handed-co-ordinate system	1. δ_{mn}
B. Invariant under rotation	2. Vector
C. Changes according to $a_i = T_{ij}a_j$	3. Scalar
D. Product of transformation matrix $T_{im}T_{ni}$	4. $\hat{x}_1.(\hat{x}_2 \times \hat{x}_3) = 1$

- A-1,B-3,C-2,D-4
- A-4,B-3,C-2,D-1
- A-1,B-2,C-3,D-4
- A-4,B-3,C-4,D-2

No, the answer is incorrect.
Score: 0
Accepted Answers:
A-4,B-3,C-2,D-1