



الامتحان التنافسي للمتقدمين للدراسات العليا (الدكتوراه) لقسم الفيزياء-كلية العلوم
جامعة بغداد للعام الدراسي ٢٠١٦-٢٠١٧
الاختصاص: التحسس النائي والمعالجة الصورية
اولاً: الورقة العامة ٢٠%

1- Multiple Choice Questions:

Q.1) A baseball has a mass of 0.145kg. The resultant force required to given this baseball an acceleration of 400m/sec² is: a) 85N, b) 58 N, c) 77 N, d) 60 N.

Q.2) An electric motor exerts a force of 400N on a cable and pulls it a distance of 30m in 1 min. the power supplied by the motor is : a) 200 watt, b) 150 watt, c) 300 watt, d) 234 watt.

Q.3) The Hamilton's function for one-dimension harmonic oscillator is:

a) $H = \frac{p^2}{2m} + \frac{k}{2}x^2$, b) $H = \frac{m}{2}v^2 + \frac{k}{2}x^2$, c) $H = \frac{p^2}{2m} - \frac{k}{2}x^2$, d) $H = \frac{m}{2}v^2 - \frac{k}{2}x^2$.

Q.4) The diffraction condition is -----

a) $\Delta K = G$ b) $(K+G)^2 = K^2$ c) $K^2 = K'^2$ d) $K+G=K'$

Q.5) Bragg law satisfied only for wavelength

a) $\lambda = 2d$ b) $\lambda \leq 2d$ c) $\lambda \geq 2d$ d) $\lambda = d$

Q.6) There are ----- units of NaCl

a) eight b) four c) three d) two

Q.7) Matrix which does not have an inverse by solving it, is classified as

a) unidentified matrix b) linear matrix c) non-singular matrix d) singular matrix

Q.8) According to determinant properties, multiple of one row is added to another row then determinant

a) changed b) unchanged c) multiplied d) added e) singular matrix

Q.9) $\text{Cosh}^{-1}x =$

a) $\ln(x + \sqrt{x^2 + 1})$ b) $\ln(x + \sqrt{x^2 - 1})$ c) $1/2 \ln(1+x/1-x)$ d) $1/2 \ln(x+1/x-1)$

Q.10) The unit of angular momentum is:

a) \hbar b) $\hbar/2$ c) $n\hbar$ d) \hbar^2

Q.11) Which of the following relations are correct for the angular momentum representation

a) $L^2 |lm\rangle = \hbar^2(l+1) |lm\rangle$ b) $L^2 |lm\rangle = \hbar^2 l |lm\rangle$

c) $L^2 |lm\rangle = \hbar^2 |lm\rangle$ d) $L^2 |lm\rangle = \hbar^2(l^2) |lm\rangle$

Q.12) Hydrogen like atom represented according to one of the following frame of reference

a) (r, θ, Φ) b) (r, θ, z) c) (x, y, z) d) $(q_1, q_2, q_3, \dots, q_n)$



2- Short Note Questions:

Q.1) A pendulum bob with a weight of 20N hangs from a cord. A horizontal force sufficient to bring the cord to an angle of 25° with the vertical is applied to the bob. Find the tension in the cord?

Q.2) A ball is thrown horizontally with a velocity of 50ft/sec from a tower 100ft high. Find the time of flight?

Q.3) Write briefly about geometrical structure factor

Q.4) Write briefly about Brillouin zone

Q.5) Find the area of a parallelogram whose adjacent are $\hat{i} - 2\hat{j} + 3\hat{k}$ and $2\hat{i} + \hat{j} - 4\hat{k}$.

Q.6) Express $\cos^6 \theta$ in multiple angles.

Q.7) Given that in harmonic oscillator system in one dimension $\Psi_n = \frac{1}{\sqrt{n!}} (a^+)^n \Psi_0$

Rewrite this equation to produce Ψ_5 and find Ψ_5 in term of Ψ_3

Q.8) the orbital angular momentum quantum number (ℓ) has a projection quantum number (m_ℓ), then if $\ell = 3$ find the possible values of m_ℓ



الاختصاص: فيزياء التحسس النائي والمعالجة الصورية

2 Multiple Choice Question:

- Q.1 The Radiometric and Geometric corrections are classified as (preprocessing, classification)
- Q.2) The GPS system operate in modes. (2, 4, & 3)
- Q.3)The remote sensors are use to record portions of spectrum. (reflected, emitted, Both)
- Q.4)The Additive Color are,, and (MYC, RGB)
- Q.5)The most suitable spectral band for water detection is (Red, FIR, NIR)
- Q.6)Quick-Bird, & IKONOS are Imaging satellites. (Earth resources, high resolution)
- Q.7)To convert continuous image $f(x, y)$ to digital form, we have to sample function in coordinates is called:
- a. sampling b. quantization c. Signaling d. digitizing
- Q.8)Consider an image of size $M \times N$ with 64 gray levels. The total number of bytes required to store this digitize image is.
- a. $M \times N \times 64$ b. $M \times N \times 6$ c. $M \times N \times 6 \times 8$ d. $M \times N \times 6 / 8$
- Q.9)Fourier stated that periodic function is expressed as sum of,
- a- sine b-cosine c-tangent d-Both A and B
- Q.10)If pixels are reconstructed without error mapping is said to be
- a-Reversible b- irreversible c-temporal d- facsimile
- Q.11)Histogram equalization refers to image.
- a-Sampling b-quantization c-framing d-normalization
- Q.12) Decoder is used for
- a-image enhancement b-image compression c- image decompression d-image equalization

2 Short Note Questions

- Q.1) Contrast between cross truck and along truck scanner.
- Q.2) List four major characteristics of imaging satellites orbits.
- Q.3) List the variation that can be detected by remote sensing systems.
- Q.4) Discuss in brief the remote sensing model.
- Q.5) What do you mean by sampling and quantization?
- Q.6)What do you mean by 8-neighbors of pixel? How it can be represented?
- Q.7)Name the categories of Image Enhancement and explain?
- Q.8)What is inverse filtering?