المستوى: الأول المادة : تفاضل وتكامل كود المادة ر ١١٢	كلية العلوم – قسم الرياضيات	الزمن: ساعتين التاريخ : ١٤ /٥/ ٢٠١٦ الدرجة الكلية: ٨٠ درجة

البرنامج: جميع برامج المستوى الأول

أجب عن أربعة أسئلة فقط مما يلى

السؤال الأول إجبارى للشعب الرياضية والفيزيائية:- (٢٠ درجة)

أ- أوجد مساحة المنطقة المحدودة بالمنحنيات $y = x^2,\ y = x + 2$. (٦ درجات)

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i)\ \int_{-2}^{2} |x+1|\,dx$ $(ii)\ \int sin^2x\ cos^3x\ dx$

ج- حدد مناطق التزايد والتناقص والقيم العظمى والصغرى المحلية للدالة

$f(x) = \frac{1}{3}x^3 - x^2 - 3x + 3$. (٦ درجات)

السؤال الثانى:- (٢٠ درجة)

أ-أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٨ درجات)

$(i) y = tan^{-1}(5x) + (tan5x)^{-1}$ $(ii)\ ysinx + x^3 = xe^x$

ب- أوجد كلاً من التكاملات التالية: (٨ درجات)

$(i)\ \int tan^{-1}x\ dx$ $(ii)\ \int \frac{1}{x(lnx)^2}\,dx$

ج- إدرس اتصال الدالة التالية عند $x = -3$، (٤ درجات)

$$f(x) = \begin{cases} \frac{x^2-9}{x+3} & ,x \neq -3 \\ 5 & ,x = -3 \end{cases}$$

السؤال الثالث:- (٢٠ درجة)

أ- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$(i)\ y = (x^2+1)^{cosx}$ $(ii)\ y = e^{sin3x}\sec(x^3+5)$ (٦درجات)

ب- أوجد كلاً من التكاملات التالية:

$(i)\ \int (tan3x + sec3x)^2\ dx$ $(ii)\ \int \frac{1}{\sqrt{4-x^2}}\,dx$

ج- إدرس إمكانية وجود معكوس للدالة $f(x) = \frac{x-3}{x+2}$ حيث $f: \mathbb{R} - \{-2\} \to \mathbb{R} - \{1\}$، ثم أوجده إن وجد. (٨ درجات)

إقلب الصفحة

السؤال الرابع:- (٢٠ درجة)

أ- أوجد كلاً من التكاملات التالية: (٦ درجات)

$(i)\int_0^1 x^2\, e^x dx$ $(ii)\int_0^{10} \frac{x}{\sqrt{x^2+4}} dx$

ب- أوجد $\frac{dy}{dx}$ لكل من الدوال التالية: (٦ درجات)

$(i)\ y = 2^{\sin^{-1}x}$ $(ii)\ y = \ln(\sec x)$

ج- إذا كانت $f(x) = \sqrt{2-x}$، $g(x) = x^2 + 2x$ أوجد مجال تعريف كل منهما ثم أوجد $f^{\circ}g$، $g^{\circ}f$. (٨ درجات)

السؤال الخامس:- (٢٠ درجة)

أ- أوجد كلاً من النهايات التالية: (٨ درجات)

$(i)\ \lim_{x\to 0^+} x\ln x$ $(ii)\ \lim_{x\to 81} \frac{\sqrt[4]{x}-3}{\sqrt{x}-9}$

ب- أوجد المشتقة الثانية للدالة $f(x) = x^2 + \frac{1}{x^2}$ عندما $x = 1$. (٦درجات)

ج- أوجد كل من التكاملات التالية: (٦ درجات)

$(i)\int \frac{1}{\sqrt{x}(5+\sqrt{x})^2} dx$ $(ii)\int sec^2x\, tan^3x\, dx$

مع أطيب التمنيات

أسرة قسم الرياضيات

Mansoura University Faculty of Science Department of Physics Phys. 102	Final Exam 2015-2016	Time Allowed: 2 h Date: 21/ 5 / 2016 First year: All programs Total Degree: 60

Answer the following Questions:

Q.1) Choose the correct answer: (30 Marks)

1. Biot-Savart Law *is* given by

(A) $dB = \frac{\mu_0}{4\pi} \times \frac{I\,dl \sin\theta}{r^2}$ (B) $dB = \frac{\mu_0}{2\pi} \times \frac{I\,dl \sin\theta}{r^2}$ (C) $dB = \frac{\mu_0}{4\pi} \times \frac{I\,dl \sin\theta}{r}$ (D) None

2. Calculate the electric field at a distance of 3.0cm on a positive test charge due to a charge of 2.0×10^{-6} C. Take ($1/4\pi\varepsilon_0 = 9.0 \times 10^9$ $N.m^2/C^2$).

(A) 2.0×10^7 N C^{-1}, (B) 6.0×10^7 N C^{-1}, (C) 5.4×10 N C^{-1}, (D) 4.05×10^{11} N C^{-1}

3. The capacitance of a capacitor may be increased by

(A) decreasing the amount of charge stored (B) increasing the surface area of the plate
(C) increasing the voltage across the plate (D) decreasing dielectric constant

4. In fiber optic thread, refractive index of inner core is

(A) Less than cladding (B) equal to cladding, (C) Both A and B (D)Higher than Cladding.

5. A wire (length = 2.0 m, diameter = 1.0 mm) has a resistance of 0.45Ω. What is the resistivity of the material used to make the wire?

(A). $5.6 \times 10^{-7}\ \Omega \cdot m$ (B). $1.2 \times 10^{-7}\ \Omega \cdot m$ (C) . $1.77 \times 10^{-7}\ \Omega \cdot m$

6. A 9.0-V battery is connected between two parallel metal plates 4.0 mm apart. What is the magnitude of the electric field between the plates?

(A) 2.3×10^3 N/C (B) 9.0 N/C (C) 2.3 N/C (D) 0.75×10^{-6} N/C

7. A uniform electric field, with a magnitude of 600 N/C, is directed parallel to the positive x-axis. If the potential at x = 3.0 m is 1000 V, what is the change in potential energy of a proton as it moves from x = 3.0 m to x = 1.0 m? ($q_p = 1.6 \times 10^{-19}$ C).

(A) 8.0×10^{-17} J (B) 1.9×10^{-16} J (C) 0.80×10^{-21} J (D) 2.2×10^{-15} J

8. If a body P, with a positive charge, is placed in contact with another uncharged body A. What is the charge on A?

(A). must be equal in magnitude to that on P (B). must be negative
(C). must be positive (D). must be greater in magnitude than that on P

9. Total internal reflection occurs when

(A) Light passes from a denser to a lighter medium (B) Light comes into the air from the vacuum (C) Light goes to vacuum from air (D) light passes from more denser to less denser medium.

10. Can electric field lines intersect in free space?

(A) Yes, but only at the midpoint between two equal like charges. (B) Yes, but only at the midpoint between a positive and a negative charge. (C) Yes, but only at the centroid of an equilateral triangle with like charges at each corner. (D) No.

11. What is the electric field (E) value when a force equals to 300 N affected on 6 μC charge?

(A) $5x10^7$ N/C (B) $5.5x10^8$ N/C (C) $7x10^7$ N/C (D) $8.5x10^9$ N/C

12. Two parallel plates having a potential difference of 30 V between them are spaced 0.04 mm. The electric field strength is .

(A) 7500 V/m (B) 34000 V/m (C) 750000 V/m (D) 6000 V

13. Which of the following about a magnetic field is correct?

(A) The unlike magnetic poles repel. (B) A magnetic pole can be isolated.
(C) Tanget of magnetic field lines indicate the direction of the magnetic field.
(D) A magnetic pole cannot induce magnetic poles in other materials.

14. Several electrons are placed on a hollow conducting sphere. They

(A) clump together on the sphere's outer surface. (B) clump together on the sphere's inner surface. (C) become uniformly distributed on the sphere's outer surface- They get as far away from each other as possible (D) become uniformly distributed on the sphere's inner surface.

15. If a capacitor parallel- plate having a charge of 10 μC and a voltage of 10V is applied across it. Hence, the energy stored will be

(A) 20 μJ (B) 30 μJ (C) 50 μJ (D) 75 μJ

Q.2). Answer the following questions (15 Marks)

Q 2a.) Describe a general relationship between the net electric flux through a closed surface (often called a *gaussian surface*) and the charge enclosed by the surface.

Q 2b.) Find the frequency of a circulating charge in a magnetic field B.

Q 2c) Deduce the expression for the magnetic force due to a wire carrying current.

Q.3a) Write True or False for each statement. (10 Marks)

1. A positive charge placed in an electric field experiences a force in the direction of the field.
2. The equivalent capacitance of two capacitors connected in parallel is always greater than the larger of the two capacitance values.
3. The electric lines of force begin on positive charge and terminate on the negative charge.
4. Capacitors connected in series carry the same charge Q.
5. When light passes from one medium to another, its frequency does not change but its wavelength changes.
6. The electric field inside a conductor is zero in the static situation.
7. Lorentz Law State that $F = q_0(Ev_d + v \times B)$
8. Ampere's law states that $\oint B.dl = \mu_o i$.
9. In ohmic materials, the current density J is inversely proportional to the electric field E
10. The magnetic force has a maximum values when the directionof the magnetic field is parallel to the velocity direction (v) of the charge q.

Q.3b) Three capacitors (4 μF, 8 μF and 16 μF) are connected in parallel across a 200 V power supply. Determine (A) the equivalent capacitance . (B) the charge on each capacitor. (5 Marks)

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