Sir Syed University of Engineering & Technology
Faculty of Computing & Applied Sciences
Department of ____Software Engineering_____

Online End Semester Examinations (Spring 2021)

Course Code with Title	**MS-111: Applied Physics**		**Program**	BS (Software Engineering)
Instructor	**Dr. M. Akhlaque Ahmed/ Anjum Khairi/ Fizza Abbas**		**Semester**	2nd
Start date & Time	June 21, 2021 at 08:30 AM	**Submission Deadline**	June 21, 2021 at 1:30PM	
Maximum Marks	50			
Students must meet their submission deadline as there is no re-take or re-attempt after the deadline.				

IMPORTANT INSTRUCTIONS:

Read the following Instructions carefully:

- Attempt All Questions on MS-Word. Font theme and size must be Times New Roman and 12 points respectively. Use line spacing 1.5.
- You may provide answers HANDWRITTEN. The scanned solution must be submitted in PDF file format (Use any suitable Mobile Application for Scanning)
- For Diagrams, you can use paper and share a clear visible snapshot in the same Answer Sheet.
- Arrange questions and their subsequent parts in sequence.
- Make sure that your answers are not plagiarized or copied from any other sources. In case of plagiarism, **ZERO** marks will be awarded.
- Provide relevant, original and conceptual answers, as this exam aims to test your ability to examine, explain, modify or develop concepts discussed during the course.
- Recheck your answer before the submission on **VLE** to correct any content or language related errors.
- You must upload your answers via the VLE platform ONLY.

You must follow general guideline for students before online examination and during online examination which had already shared by email and WhatsApp.

This paper has a total of _06__ pages including this title page

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GROUP 1:
Include students having roll numbers ended with 0,1 or 2.

GROUP 2:
Include students having roll numbers ended with 3,4 or 5.

GROUP 3:
Include students having roll numbers ended with 6,7,8 or 9.

Q.1. **(10)**

(Group 1:part a, b, c only) (Group 2:part d, e, f only) (Group 3:part g, h, i only)

a) Suppose that a Gaussian surface encloses no net charge. In your opinion, does Gauss's law require that E equals zero for all points on the surface? Is the converse of this statement true; that is, E equals zero everywhere on the surface, does Gauss's law require that there be no net charge inside? **(4)**

b) Observing your environment can you identify any system which obeys Zeroth law of thermodynamics? **(3)**

c) How Brittle and Ductile materials are differed to each other, define using graphs and daily life examples. **(3)**

d) When an emf is induced by a change in magnetic flux, the polarity of the induced emf is negative, define the reason in your own words. **(4)**

e) It is desired to demagnetize a sample of ferromagnetic material that retains magnetism that acquired when placed in an external magnetic field. Explain on the base of your understanding. **(3)**

f) Connect a resistor, a capacitor and an inductor with ac voltage source in such a combination that we get maximum current in the circuit at resonance frequency, what will be the value of angular frequency at resonance condition? **(3)**

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g) You are given two capacitors, C_1 and C_2, in which $C_1 > C_2$. Define according to your understanding that how could things be arranged so that C_2 could hold more charge than C_1? **(4)**

h) Considering examples from environment, differentiate between laminar flow and turbulent flow. **(3)**

i) Which magnetic material has strong magnetic dipole effect after the removal of applied magnetic field, ferromagnetic or paramagnetic materials. **(3)**

Q.2. (10)

(Group 1:part a, b only) (Group 2:part c, d only) (Group 3:part e, f only)

a) Ideal fluids are steady and incompressible. Can you apply conservation law for matter on such fluids? Explain your answer to be true or false by considering a situation in which ideal fluid flow through a pipe. **(5)**

b) If a Carnot engine is independent of the working substance, then perhaps real engines should be similarly independent to a certain extend. Can we calculate the work done during a reversible process in terms of an area on a PV diagram? Write your answer in detail considering an example. **(5)**

c) Justify the following statement according to your understanding; "If the solenoid is long in comparison with its cross-sectional diameter and the coils are tightly wound, it's magnetic field depends upon number of turns and current flowing through it." **(5)**

d) Consider a thermodynamic system working between two states initial 'i' and final 'f', having different set of processes. Using PV diagram describe each process and prove that the total internal energy of the system remains constant. **(5)**

e) Let us consider an incompressible, non-viscous laminar fluid flowing through a frictionless, non-uniform cross-sectional area and varying height pipe to estimate the Bernoulli's equation. Interpret the physical concept of this equation in your own words. **(5)**

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f) Show the fermi level status using energy band diagram of PN junction before and after biasing. **(5)**

Q.3. (10)

(Group 1: part a, b only) (Group 2: part c, d only) (Group 3: part e, f only)

a) Consider any geometrical shape on which positive charges are symmetrically distributed. Then calculate the electric field on a point near the region around the charges. **(5)**

b) Light has dual nature, wave and particle. What nature is suggested by single slit experiment for diffraction. Defend your answer with mathematical expression. **(5)**

c) Connect a resistor R a capacitor C in series with dc field then what will happen when capacitor charge and discharge in the circuit. Deduce an equation for growth and decay of current with graphs **(5)**

d) Give examples of Dia, Para and Ferro magnetic materials respectively and compare their magnetic properties according to their behavior shown when external field is applied. Justify your answer with diagrams. **(5)**

e) Light has dual nature wave and particle. What nature is suggested by Young's double slit experiment? Defend your answer with mathematical expression. **(5)**

f) Is pn diode is an extrinsic semiconductor? Explain in your own words how the thickness of the depletion zone of pn junction can be affected by forward bias voltage and reversed bias voltage. **(5)**

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Calculate the following values before you start solving Question 3.

I. *A* = 4 + *Y* where, Y= add all digits of your Roll Number e.g., 0+5+2 = 7 (If your Roll Number is 052)

Q.4. (10)

(Group 1: part a, b only) (Group 2: part c, d only) (Group 3: part e, f only)

a) A monochromatic light of wavelength (**750 - A**) nm falls on a single slit and produces its third diffraction minimum at an angle of 35° relative to the incident direction of the light. Compute the width of the slit. Also compute the angle at which the second maxima are produced. **(5)**

b) A heat engine absorbs (**A) KJ** of heat and exhaust **(A+4) KJ** of heat each cycle. Compute the efficiency and the work done by the engine per cycle. **(5)**

c) A monochromatic light of wavelength (**670** + **A**) nm falls on a single slit and produces its third diffraction minimum at an angle of 30° relative to the incident direction of the light. Compute the width of the slit. Also compute the angle at which the second maxima are produced. **(5)**

d) A heat engine absorbs (**A) KJ** of heat and exhaust **(A-3) KJ** of heat each cycle. Compute the efficiency and the work done by the engine per cycle. **(5)**

e) A monochromatic light of wavelength (**550 - A**) nm falls on a single slit and produces its third diffraction minimum at an angle of 25° relative to the incident direction of the light. Compute the width of the slit. Also compute the angle at which the second maxima are produced. **(5)**

f) A heat engine absorbs (**A) KJ** of heat and exhaust **(A-2) KJ** of heat each cycle. Compute the efficiency and the work done by the engine per cycle. **(5)**

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Q.5. **(10)**

(Group 1: part a, b only) (Group 2: part c, d only) (Group 3: part e, f only)

a) Compute the extension in length of a wire 530 cm long and a diameter of 0.25 cm. When the body of mass (**90*A**) **gm** is applied vertically. The young modulus of given wire is $5x10^9$ Dyne/cm^2. **(5)**

b) Compute the probability of occupancy for these levels at T = 550 ^oC. Consider three different energy levels, having different energies, such as,

1. +**2.8(A/100) eV** (above fermi level)
2. -**2.8(A/100) eV** (below fermi level)
3. Equal to fermi level **(5)**

c) Compute the extension in length of a wire 530 cm long and a diameter of 0.15 cm. When the body of mass (**80*A**) **gm** is applied vertically. The young modulus of given wire is $5x10^9$ Dyne/cm^2. **(5)**

d) Compute the probability of occupancy for these levels at T = 350 ^oC. Consider three different energy levels, having different energies, such as,

1. +**2(A/100) eV** (above fermi level)
2. -**2(A/100) eV** (below fermi level)
3. Equal to fermi level **(5)**

e) Compute the extension in length of a wire 530 cm long and a diameter of 0.2 cm. When the body of mass (**95*A**) **gm** is applied vertically. The young modulus of given wire is $5x10^9$ Dyne/cm^2. **(5)**

f) Compute the probability of occupancy for these levels at T = 600 ^oC. Consider three different energy levels, having different energies, such as,

1. +**3(A/100) eV** (above fermi level)
2. -**3(A/100) eV** (below fermi level)
3. Equal to fermi level **(5)**