

Reg. No. :

Name :

**Fourth Semester B.Sc. Degree Examination, July 2019
Career Related FPD under CBCSS**

Group 2(a) – Physics and Computer Applications

Vocational Course – PC 1471

SOFTWARE ENGINEERING

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION A [Very Short Answer Type]
(One word to maximum of one sentence. Answer **all** questions)

1. What is software engineering?
2. Define requirement engineering.
3. What is data modeling?
4. What is DFD?
5. What is Coupling?
6. Write any two characteristics of SRS.
7. What is meant by error?
8. Define test oracle.
9. What is data dictionary?
10. What does UML stand for?

(10 × 1 = 10 Marks)

SECTION – B [Short Answers]

(Not to exceed one paragraph. answer any **eight** questions. Each question carries **2** marks)

11. What are the characteristics of a software?
12. What are the merits of incremental model?
13. Write a note on COCOMO Model.
14. What is class diagram?
15. What is a modular system? List the important properties of modular system.
16. What is decision table?
17. What is WalkThroughs?
18. Write a note on structure chart.
19. Define open closed principle.
20. Define the terms
 - (a) Fault
 - (b) Failure
21. Discuss the various steps of data flow testing.
22. Explain cause effect graphing.

(8 × 2 = 16 Marks)

SECTION – C [Short Essay]

(Not to Exceed 120 words, answer any **six** questions. Each question carries **4** marks)

23. Briefly explain waterfall model.
24. Explain the various prototyping approaches in details.
25. Write a note on ER diagram.
26. What is the difference between module coupling and module cohesion? List different types of coupling and cohesion.
27. Explain about sequence diagram.
28. Write a note on consistency checkers.
29. Describe the equivalence class testing methods. Compare this with boundary value analysis method.
30. Write shorts notes on black box and white box testing.
31. What are the metrics used for software cost estimation? **(6 × 4 = 24 Marks)**

SECTION D (Long Essay)

(Answer any **two** questions. Each question carries **15** marks)

32. What is requirement engineering? State its process.
33. Explain in detail about Functional Oriented design.
34. Explain object oriented concept in software engineering.
35. Write a note on
 - (a) Spiral model and Time Boxing model
 - (b) Code Inspection **(2 × 15 = 30 Marks)**

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Fourth Semester B.Sc. Degree Examination, July 2019

Career Related First Degree Programme Under CBCSS

PHYSICS WITH COMPUTER APPLICATIONS

Core Course

PC 1442 – OPTICS

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Very short answer questions. Answer **all** questions. Each question carries 1 mark

1. What do you mean by coherent sources?
2. Mention any two applications of Michelson's interferometer.
3. Write down any two dissimilarities between a convex lens and a zone plate.
4. Write down the expression for the resolving power of a grating and explain the symbols.
5. State Malu's Law.
6. What do you mean by Quarter wave plate.
7. Write down Cauchy's dispersion formula and explain the symbols.
8. What is meant by graded index fibre?
9. What is meant by population inversion.
10. What is meant by do you mean by spontaneous emission of radiation?

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Short answer type questions. Answer **any eight** questions. Each question carries 2 marks

11. State principle of superposition of light. If $\lambda/4$ is the path difference between two light waves, what is the corresponding phase difference?
12. What are fringes of equal thickness? Give an example for it.
13. Explain the testing of optical flatness of a glass plate using interference.
14. What is meant by zone plate?
15. What is meant by Fraunhofer diffraction?
16. Draw the intensity distribution curve due to diffraction at a straight edge.
17. What is meant by polarizing angle? Give its relation with refractive index.
18. What are negative and positive crystals?
19. What is meant by plane polarized light?
20. What is meant by anomalous dispersion?
21. What is meant by optical fibre sensors? Give one application.
22. Give any four characteristics of laser beam.

(8 × 2 = 16 Marks)

SECTION – C

Short essay type questions. Answer **any six** questions. Each question carries 4 marks

23. With a neat diagram derive the cosine law for the interference in thin films
24. What do you mean by Haidinger's fringes? In a Michelson's interferometer it is found that 200 fringes cross the field of view when the movable mirror is displaced through 0.049 mm. Calculate the wavelength of light used.

25. Discuss the Fresnel diffraction at a circular aperture.
26. A monochromatic light of wavelength 5000 \AA from a distant source falls on a slit of 0.5 mm wide. What is the distance between the first two dark bands on either side of the central bright band on a screen placed at 2 m from the slit?
27. Explain the production of circularly polarized light from on polarized light.
28. When sun light is incident on water surface at a glancing angle of 37° , the reflected light is found to be completely plane polarized, Determine the refractive index of water and angle of refraction.
29. Explain Wood's experiment on dispersion.
30. Derive an expression for the numerical aperture of a step index fibre.
31. Explain spatial coherence and temporal coherence.

(6 × 4 = 24 Marks)

SECTION – D

Long essay type questions. Answer any two questions. Each question carries 15 marks

32. Explain the formation of Newton's rings in reflected system. With the help of a diagram deduce an expression for the radius of n^{th} dark ring and the wavelength of the light.
33. Discuss the Fraunhofer diffraction at a double slit and draw the intensity pattern.
34. Explain the analysis of plane, circularly and elliptically polarized lights.
35. Explain the three types of transitions of atoms between two energy levels. Explain Einstein coefficients related with atomic transitions and derive an expression for the ratio of the number of spontaneous emissions to stimulated emissions.

(2 × 15 = 30 Marks)

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Career Related First Degree Programme Under CBCSS

PHYSICS WITH COMPUTER APPLICATIONS

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PC 1442 – OPTICS

(2014 Admission onwards)

Time : 3 Hours

Max. Marks : 80

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P.T.O.

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11. State principle of superposition of light. If $\lambda/4$ is the path difference between two light waves, what is the corresponding phase difference?
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34. Explain the analysis of plane, circularly and elliptically polarized lights.
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(2 × 15 = 30 Marks)

(Pages : 3)

G – 4211

Reg. No. :

Name :

Fourth Semester B.Sc. Degree Examination, July 2019

Career Related First Degree Programme under CBCSS

Physics with Computer Applications

Core Course

PC 1441 : CLASSICAL MECHANICS AND THEORY OF RELATIVITY

(2015 Admission onwards)

Time : 3 Hours .

Max. Marks : 80

SECTION – A

Very Short answer type, Answer all questions. Each carries 1 mark. :

1. A spring is executing simple harmonic motion with amplitude a . What will be the value of displacement at which potential energy is half maximum?
2. The length of a simple pendulum is increased by 44%. What is the percentage increase in its period?
3. The work done by a force is recoverable, the force is called?
4. The region of constant potential energy in potential energy curve is called?
5. Which quantities remain constant in a planetary model?
6. The escape velocity from a planet having twice the radius and the same mean density as those of the earth is? (Escape velocity of the earth is 11 Kms^{-1}).
7. The number of degrees of freedom for a rigid body which has two fixed end is?

P.T.O.

8. Rotational symmetry leads to law of conservation of?
9. The momentum of an electron of mass m , which has the same kinetic energy as its rest mass energy is
10. In relativity, which one is an invariant quantity?

(10 × 1 = 10 Marks)

SECTION – B

Short answer type, Answer any **eight**, Each question carries **2** marks.

11. What is a periodic motion?
12. What is the difference between a simple pendulum and a compound pendulum?
13. What is the effect of damping on the motion?
14. What is meant by central force? Give two examples?
15. State and explain the Kepler's third law of planetary motion.
16. What is meant by degrees of freedom?
17. Explain the term holonomic and non holonomic constraints.
18. Explain the term virtual displacements.
19. Write down the Lagrange's equation of motion and explain the symbols.
20. What is ether hypothesis?
21. Explain the term length contraction.
22. Explain Lorentz-Fitzgerald contraction.

(8 × 2 = 16 Marks)

SECTION – C

Short Essay type, Answer any **six**, Each question carries **4** marks. :

23. In simple harmonic motion, when the displacement is one half the amplitude, what fraction of the total energy is kinetic and what fraction is potential?
24. Explain anharmonic oscillators.
25. Obtain an expression for the escape velocity of a planet.
26. Explain D'Alemberts principle.
27. Explain generalized momentum.
28. Show that, for static equilibrium of the Atwood's machine two masses must be equal.
29. How does mass vary with velocity?
30. Find the velocity at which the mass of a particle is double its rest mass.
31. Distinguish between Newtonian mechanics and Relativity.

(6 × 4 = 24 Marks)

SECTION – D

Long essay type, Answer any **two**, Each carries **15** marks. :

32. Derive an expression for the time period of a simple pendulum.
33. Deduce Kepler's laws of planetary motion from Newton's law of gravitation.
34. Set up the Lagrangian of a simple pendulum and obtain the equation of the motion.
35. Explain the consequences of Lorentz transformation equation.

(2 × 15 = 30 Marks)

(Pages : 3)

G – 3916

Reg. No. :

Name :

Fourth Semester B.A./B.Sc. Degree Examination, July 2019

First Degree Programme Under CBCSS

LANGUAGE COURSE : VIII AND VI READINGS IN LITERATURE

(Common for B.A./B.Sc. EN 1411.1 and Career Related 2(a) EN 1411.3)

(2015 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

- I. Answer **all** questions, each in a word or a sentence.
1. How does Jacques portray the lover?
2. What did the pale kings and princes tell the knight – of – arms?
3. What did Sophocles hear on the shores of the Aegean?
4. Where does Ulysses expect to meet Achilles again?
5. How many languages does Kamala Das claim to know?
6. What is the title of Lowes Dickinson's book?
7. What according to Priestly is the main theme of Wordsworth?
8. Why did Dr. Raman deviate from his usual course in the case of Gopal?
9. How did the lady in K.R. Meera's story come to know about the fellow patient's death?
10. What did the prisoner do in the last two years of his confinement?

(10 × 1 = 10 Marks)

P.T.O.

ii. Answer any **eight**, each in a short paragraph not exceeding **50** words.

11. Wordsworth's contemplation on his life and that of the fellow poets.
12. What was Yeat's attitude to his lady-love and her husband?
13. What is Owen's concept about soldiers in the front line?
14. Robert Frost's concept of building walls.
15. What is Satchidanandan's explanation for God's stammering when He Created Man?
16. Bring out Priestly's attitude to Thoreau and Whitman.
17. Summarize Einstein's concept of the motives for scientific research.
18. Give some of the popular legends about Nehru.
19. Describe "African Dream" of family life.
20. Give an account of the eccentricities of Mr. Nuttel.
21. What is Sherlock's attitude to Balu?
22. Explain the miracle which brought Gopal back to life.

(8 × 2 = 16 Marks)

iii. Answer any **six**, each in a paragraph not exceeding **100** words.

23. Bring out the transition from the "lover" to the "soldier" as presented by William Shakespeare.
24. Describe the knight's dream at the Elfin Grot.
25. Give an account on Arnold's views on the modern man and his world.
26. Ulysses' concept of Telemachus.

27. Evaluate the effect of the constable's visit on the poet.
28. Kamla Das' attitude to male ego and patriarchal society.
29. How does Sarojini Naidu propose to overcome fate which may rob her of her power of articulation?
30. Describe the humiliation and discrimination that Blacks had to experience in South Africa.
31. Sherlock's status in Balu's sister's house.

(6 × 4 = 24 Marks)

IV. Answer any **two** in about **300** words.

32. Justify Kamala Das' assertion of femininity in the poem introduction.
33. Consider Wilfred Owen's poem Insensibility as a depiction of the "Unresolved tension of pity and anger at war".
34. Evaluate Mandela's presentation of the misery of Blacks in South Africa.
35. Bring out the tension and fury in Balu's attitude to Sherlock.

(2 × 15 = 30 Marks)

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Fourth Semester B.Sc. Degree Examination, July 2019

CAREER RELATED FIRST DEGREE PROGRAMME UNDER CBCSS

Group 2 (a) Complementary Course for Physics and Computer Applications

MM 1431.6 : MATHEMATICS - IV - LINEAR TRANSFORMATIONS, VECTOR INTEGRATION AND COMPLEX ANALYSIS

(2013 admission onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – I

All the first **ten** questions are compulsory. They carry **1** mark each :

1. Suppose that the mapping $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be defined by $F(x, y) = (x + y, x)$. Show that F is a linear transformation.
2. Find the matrix that represents the linear transformation that maps (x, y) to $(2x - 5y, 3x + 4y)$ with respect to the standard basis.
3. Let $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be the linear transformation that maps each vector into its symmetric image about the y - axis. What is the matrix representation of T with respect to the standard basis?
4. Describe dilation with factor k on \mathbb{R}^2 ?
5. Find the work done by the force field $F(x, y) = xyi + x^2j$ on a particle that moves along the curve $x = y^2$ from $(0, 0)$ to $(1, 1)$.
6. Explain the physical interpretation of curl of a vector field \vec{F} .

7. Let $z = x + iy$, find $\operatorname{Re}\left(\frac{1}{z}\right)$.
8. Define sine function of a complex variable z .
9. State Cauchy's integral theorem.
10. Give an example of an entire function.

SECTION – II

Answer any **eight** questions from among the questions 11 to 22. These question carry **2** marks each.

11. Let T be a linear transformation from \mathbb{R}^3 to \mathbb{R}^2 defined by $T(a, b, c) = (a + b, 6a - b + 2c)$. Find the matrix which represents this transformation with respect to the standard basis of \mathbb{R}^3 and the basis $\{(1, 1), (1, -1)\}$ of \mathbb{R}^2 .
12. A linear transformation $T: \mathbb{R}^3 \rightarrow \mathbb{R}^2$ has the matrix representation $\begin{bmatrix} 2 & -1 & 2 \\ 4 & 1 & 5 \end{bmatrix}$ with respect to the standard basis of \mathbb{R}^3 and the basis $\{(4, 3), (3, 2)\}$ of \mathbb{R}^2 . Find the linear transformation.
13. Find the eigen values of the matrix $A = \begin{bmatrix} 5 & 6 \\ 3 & -2 \end{bmatrix}$.
14. Evaluate the line integral $\int_C (x + 2y)dx + (x - y)dy$ along the curve $x = 2\cos t$,
 $y = 4\sin t$, $0 \leq t \leq \frac{\pi}{4}$.
15. Evaluate $\int_C \vec{F} \cdot d\vec{r}$ along the curve $\vec{r}(t) = \sin t \mathbf{i} + 3\sin t \mathbf{j} + \sin^2 t \mathbf{k}$, $0 \leq t \leq \frac{\pi}{2}$ where
 $\vec{F}(x, y, z) = z\mathbf{i} + x\mathbf{j} + y\mathbf{k}$.
16. Find the curl of $\vec{F}(x, y, z) = xyz(x\mathbf{i} + y\mathbf{j} + z\mathbf{k})$.

17. Express $\frac{3\sqrt{2} + 2i}{-\sqrt{2} - \left(\frac{2}{3}\right)i}$ in polar form.
18. Sketch the graph of $-\pi < \operatorname{Re} z < \pi$.
19. Find all values of $\sqrt[3]{3 + 4i}$ in the complex plane.
20. Evaluate $\int_C \bar{z} dz$ from $-1 + i$ along the parabola $y = x^2$ to $1 + i$.
21. Evaluate $\int_C \frac{z^2}{z-3} dz$ where C is the circle $|z| = 1$.
22. Evaluate $\int_C \frac{dz}{z}$ where C is the unit circle.

SECTION - III

Answer any **six** questions from among the questions 23 to 31. These question carry **4** marks each.

23. Let $F: \mathbb{R}^2 \rightarrow \mathbb{R}^2$ be the linear transformation defined by $F(x, y) = (2x + 3y, 4x - 5y)$. Find the matrix representation of F relative to the basis $S = \{(1, 2), (2, 5)\}$.
24. If the matrix of a linear transformation T from \mathbb{R}^2 to \mathbb{R}^2 with respect to the basis $\mathfrak{B} = \{(1, 0), (0, 1)\}$ is $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$. What is the matrix of T with respect to the basis $\mathfrak{B}' = \{(1, 1), (1, -1)\}$?
25. Use Green's theorem to evaluate the integral $\oint_C (x^2 - y^2) dx + x dy$ where C is the circle $x^2 + y^2 = 9$.
26. Determine whether $\vec{F}(x, y) = xi + yj$ is a conservative vector field. If so, find a potential function for it.
27. Evaluate the surface integral $\iint_{\sigma} xy dS$ where σ is the portion of the plane $x + y + z = 1$ lying in the first octant.

28. Is $u(x, y) = e^{-y} \sin x$ a harmonic function? If so write down an analytic function $f(z)$ such that u is its real part.
29. Show that $f'(z)$ does not exist at any point for the function $f(z) = 2x + ixy^2$.
30. Find the value of the integral $\int_C \frac{1}{z^3(z+4)} dz$ taken counterclockwise around the circle $|z| = 2$.
31. Evaluate $\int_C \frac{z+2}{z} dz$ where C is the semicircle $z = 2e^{it}$, $0 \leq t \leq \pi$.

SECTION – IV

Answer any **two** questions from among the questions 32 to 35. These question carry **15** marks each.

32. Let $\mathfrak{B} = \{(1, -2), (3, -4)\}$ and $\mathfrak{B}' = \{(1, 3), (3, 8)\}$ be two bases of \mathbb{R}^2 . Find the change-of-basis matrix P from \mathfrak{B} to \mathfrak{B}' and the change-of-basis matrix Q from \mathfrak{B}' to \mathfrak{B} . What is the relation between P and Q .
33. Verify the Divergence theorem for the vector field $\vec{F}(x, y, z) = xi + yj + zk$ and the surface σ of the cube bounded by the planes $x=0, x=1, y=0, y=1, z=0, z=1$.
34. (a) Prove that an analytic function of constant absolute value is constant.
 (b) Show that \bar{z} is not differentiable.
35. (a) Evaluate $\int_C \frac{z^2+1}{z^2-1} dz$ where C is the circle $|z-1|=1$.
 (b) Evaluate $\int_C \frac{1}{(z^2+4)^2} dz$ where C is the circle $|z-i|=2$.

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Fourth Semester B.Sc. Degree Examination, July 2019

Career related FDP under CBCSS

Group2(a)–Physics and Computer Applications

Vocational Course – PC 1472

OBJECT ORIENTED PROGRAMMING

(2014 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A (Very Short answer Type)

(One word to maximum of one sentence, Answer all questions)

1. Define Encapsulation
2. Why classes are called Abstract Data Types?
3. Why dynamic binding is known to be late binding?
4. What is meant by scope of a variable?
5. When does new operator return null?
6. Which symbol is known as insertion operator?
7. How constants are declared in C++?

8. What is purpose of break statement in C++?
9. How strings are declared in C++?
10. Give an example for pointer to pointer declaration.

(10 × 1 = 10 Marks)

SECTION – B (Short Answer)

(Not to exceed one paragraph, Answer any **eight** questions, Each question carries **2** marks)

11. What are the benefits of OOPS?
12. Explain the structure of a C++ program.
13. What are Constructors?
14. What is the purpose of this pointer?
15. Differentiate function prototype and function definition.
16. What is an anonymous class?
17. How conditional operator helps in condition checking?
18. What are 3D arrays?
19. Give any two escape sequences in C++.
20. Give the syntax and purpose of get().
21. Give an example for compound assignment statement.
22. What are relational operators?

(8 × 2 = 16 Marks)

SECTION – C (Short Essay)

(Not to exceed 120 words. Answer any **six** questions, Each question carries 4 marks)

23. Explain the technique of function overloading.
24. Give note on user defined data types in C++.
25. What are the various access modifiers in C++?
26. What is meant by implicit type conversion?
27. C++ supports multiple catch statements in exception handling. Justify.
28. What are pure virtual functions?
29. Write note on entry controlled loops.
30. What are pointers? How it manages memory access?
31. Differentiate ++p and p++.

(6 × 4 = 24 Marks)

SECTION – D (Short Essay)

(Answer any **two** Questions, Each question carries 15 marks)

32. Explain the various features of Object Oriented Programming.
33. What are the various types of inheritance supported in C++?
34. Describe in detail the Exception handling property of C++.
35. Write a program to accept the student detail such as name and three different marks by get_data() method and display the name and average of marks using display() method. Define a friend class for calculating the average of marks using the method mark_avg().

(2 × 15 = 30 Marks)