



Roll

Total No. of Pages.: 02

21N506 /

B.Tech. II Sem (New Scheme) Main Exam Acad Session 2022-23

All Branch

(2FY2-06) - Introduction to Built Environment

Time : 3 Hours

Maximum Marks: 70

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 * 2 marks = 20 marks. All 10 questions are compulsory.

Part – B: Analytical/Problem Solving questions 5 * 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving/ Design questions 3 * 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 _____

2 _____

PART-A (ATTEMPT ALL)

- Q.1. ✓ Define built environment. [2]
Q.2. ✓ What are the soil types and their responses under load? [2]
Q.3. ✓ What do you mean by earthquake resistant design? [2]
Q.4. ✓ List the factors affecting the built environment. [2]
Q.5. ✓ What do you mean by rani-water harvesting? [2]
Q.6. ✓ What do you understand by hydrological cycle? [2]
Q.7. ✓ What are field-water storage structures? [2]
Q.8. ✓ What do you mean by a deep foundation? [2]
Q.9. ✓ What do you mean by building bye-laws? [2]
Q.10. ✓ Mention any two ways steel is used in conventional constructor. [2]

P.T.O.

Z-350

PART-B

- Q.1. Explain various types of transportation systems. [4]
- Q.2. Describe lighting aspects of building. [4]
- Q.3. Explain the modern world approach towards built environment in context of securities emergencies. [4]
- Q.4. Discuss the elements of built environment. [4]
- Q.5. Discuss thermal comfort and insulation, and climate responsive design. [4]
- Q.6. Explain environmental acts and regulations. [4]
- Q.7. Describe various road traffic signs. [4]

PART- C

- Q.1. Explain the smart concept in context of cities, environment, water, metering and retail. [10]
- Q.2. Describe the five engineering divisions and their responsibility in built environment. [10]
- Q.3. Discuss various aspects of building planning. Also discuss the need of standard codes. [10]
- Q.4. What do you understand by building ergonomics? Describe acoustic and thermal aspects aspects of a building. [10]
- Q.5. Write short notes on any four: [10]
- Additive construction using concrete
 - Traffic calming
 - Reuse and saving of water
 - Chemical cycles
 - Water quality standards
 - Masonry construction

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Total No. of Pages.: 03

21N502 /

B.Tech. II Sem (New Scheme) Main Exam Acad Session 2022-23

All Branch

(2FY1-02) - Engineering Physics

21N502 /

Time : 3 Hours

Maximum Marks: 70

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 * 2 marks = 20 marks. All 10 questions are compulsory.

Part – B: Analytical/Problem Solving questions 5 * 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving/ Design questions 3 * 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 _____

2 _____

PART-A

- Q.1. Write the ratio of the diameter of dark Newton rings. [2]
- Q.2. In a single slit experiment write the formula for the intensity of secondary maxima. [2]
- Q.3. Write the Plank radiation formula for energy density. [2]
- Q.4. Draw the Basic structure of optical fibre. [2]
- Q.5. In compton effect write the formula for shift in wavelength. [2]
- Q.6. Explain normalization of wave function. [2]
- Q.7. Explain, what is fermi level? [2]
- Q.8. Explain, what is Meissner E effect? [2]

P.T.O.

Z-346

Q.9. Explain the physical interpretation of curl. [2]

Q.10. Explain the displacement current. [2]

PART-B

Q.1. In Newton's ring experiment the diameter of n^{th} and $(n+1)^{\text{th}}$ rings are 4.2 mm and 7.0 mm. If the radius of curvature of lens is 2m, then find the wavelength used. [4]

Q.2. Light of wavelength 6000 \AA is incident normally on a slit of width $24 \times 10^{-5} \text{ cm}$. Determine the angular position of second minimum. [4]

Q.3. Calculate the refractive indices of the core and cladding materials of a fiber from the data. $NA = 0.22$ and $\Delta = 0.012$. [4]

Q.4. Write a short note on semiconductor laser. [4]

Q.5. An electron is confined to a box of length 10^{-9} m . Calculate the minimum uncertainty in its velocity. [4]

Q.6. The hall coefficient of certain silicon specimens found to be $-7.5 \times 10^{-5} \text{ m}^3/\text{C}$ at a certain temperature. If the conductivity is found to be $200 \text{ } \Omega^{-1} \text{ m}^{-1}$. Calculate the density of charge carriers. <https://www.btubikaner.com> [4]

Q.7. Find $\nabla \cdot V$ for the following vector fields: [4]

a. $V = (y^2 + z^2)(x + y)\hat{x} + (z^2 + x^2)(y + z)\hat{y} + (x^2 + y^2)(z + x)\hat{z}$

b. $V = f_1(y, z)\hat{x} + f_2(x, z)\hat{y} + f_3(x, y)\hat{z}$

PART- C

Q.1. Describe the construction and working of Michelson Interferometer. Drive the expression for determine the wavelength difference of two components of a line by Michelson Interferometer. [10]

Q.2. Explain the term absorption, spontaneous emission and stimulated emission and derive a relation between Einstein's coefficients. [10]

- Q.3. Write down schrodinger's equation for a particle confined in a 1-D box. Obtain the wave function for a particle confined in this box. [10]
- Q.4. Describe the formation of energy band in solids and hence how it helps to classify the materials into conductors and insulators. [10]
- Q.5. Deduce the Maxwell's equations for free space and prove that electromagnetic waves are transverse. [10]

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B.Tech. II Sem (New Scheme) Main Exam Acad Session 2022-23

All Branch

(2FY1-01) - Engineering Mathematics II

Time : 3 Hours

Maximum Marks: 70
Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) $10 * 2$ marks = 20 marks. All 10 questions are compulsory.

Part – B: Analytical/Problem Solving questions $5 * 4$ marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving/ Design questions $3 * 10$ marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 _____

2 _____

PART-A

Q.1. Evaluate $\left[\left(\frac{-9}{2}\right)\right]$. [2]

Q.2. Evaluate $\int_0^1 \int_0^{1-x} xy dx dy$ [2]

Q.3. Evaluate $\int_0^2 (4-x^2)^{\frac{3}{2}} dx$. [2]

Q.4. Evaluate $\frac{d}{dt}(\vec{r} \times \frac{d\vec{r}}{dt})$ [2]

Q.5. Find the directional derivative of [2]

$\theta(x, y, z) = (x^2 - 2y^2 + 4z)$ at $(1, 1, -1)$ in the direction of the vector $2i + j - k$.

P.T.O.

Z-345

Q.6. State Stoke's theorem. [2]

Q.7. Define right circular cylinder. [2]

Q.8. Find the radius of the circle [2]

$$x^2 + y^2 + z^2 - 2y - 4z = 11, x + 2y + 2z = 15.$$

Q.9. Find the eigen values of the matrix. [2]

$$A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$$

Q.10. Are the following vectors linearly independent [2]

$$x_1 = (1, 3, 4, 2), x_2 = (1, 2, 3, 4), x_3 = (2, 3, 4, 9)$$

PART-B

Q.1. Evaluate by changing the order of integration. [4]

$$\int_0^{\infty} \int_r^{\infty} \frac{e^{-y}}{y} dx dy.$$

Q.2. Show that [4]

$$\int_0^2 x(8-x^3)^{1/3} dx = \frac{16\pi}{9\sqrt{3}}$$

Q.3. if $\vec{r} = xi + yj + zk$ and $r = |\vec{r}|$ then find $\nabla^2 r^n$ [4]

Q.4. Use Green's theorem to evaluate the line integral $\int_C [(xy + y^2)dx + x^2 dy]$

Where C is the boundary of the closed region bounded by $y = x$ and $y = x^2$ [4]

Q.5. Find the equation of the sphere having the circle [4]

$$x^2 + y^2 + z^2 = 9, x - 2y + 2z = 5 \text{ as a great circle.}$$

Q.6. Determine the rank of matrix [4]

$$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$

Q.7. Investigate for consistency of the following equations and if possible, Find the solutions: [4]

$$4x - 2y + 6z = 8; x + y - 3z = -1; 15x - 3y + 9z = 21$$

PART-C

Q.1. Find the volume and surface area of the solid formed by revolution of the cardioid $r = a(1 + \cos\theta)$ about the initial line. [10]

Q.2. Use Stoke's theorem to evaluate [10]

$$\int_c [(x+2y)dx + (x-z)dy + (y-z)dz]$$

Where c is the boundary of the triangle with vertices $(2, 0, 0)$, $(0, 3, 0)$ and $(0, 0, 6)$ oriented in the anti-clockwise direction.

Q.3. Find the equation of the sphere which passes through the circle $x^2 + y^2 = 4, z = 0$ and is cut by the plane $x + 2y + 2z = 0$ in a circle of radius 3. [10]

Q.4. Find the eigen values and eigen vectors of the matrix [10]

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 1 & -6 \\ 2 & -2 & 3 \end{bmatrix}$$

Q.5. Find the values of the constants a, b, c so that the directional derivative of $\phi = axy^2 + byz + cz^2x^2$ at $P(1, 2, -1)$ has maximum magnitude 64 in the direction parallel to z -axis. [10]

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B.Tech. II Sem (New Scheme) Main Exam Acad Session 2022-23

All Branch

(2FY2-09) - Elements of Mechanical Engineering

Time : 3 Hours

Maximum Marks: 70

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) $10 * 2$ marks = 20 marks. All 10 questions are compulsory.

Part – B: Analytical/Problem Solving questions $5 * 4$ marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving/ Design questions $3 * 10$ marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 _____

2 _____

PART-A

- ~~Q.1.~~ Differentiate between point function and path function.
~~Q.2.~~ Enlist the similarities between heat and work.
~~Q.3.~~ Define compression Ratio.
~~Q.4.~~ Draw P-V and T-S diagram for Carnot Cycle.
~~Q.5.~~ Draw a block diagram for the Brayton cycle and mention the function of each element.
~~Q.6.~~ Write industrial applications of the Rolling process.
~~Q.7.~~ How many atoms and molecules are there in 1 gram of Hydrogen.
~~Q.8.~~ Classification of IC engines.
~~Q.9.~~ Why is idler gear used in gear trains?

P.T.O.

Z-353

- Q.10. Determine torque transmitted on the pinion shaft if torque transmitted on the gear shaft is 20Nm. Consider Gear ratio = 4.

PART-B

- Q.1 A certain amount of an ideal gas initially at a pressure P_1 and temperature T_1 . First, it undergoes a constant pressure process 1 – 2 such that $T_2 = 3T_1/4$. Then, it undergoes a constant volume process 2 – 3 such that $T_3 = T_1/2$. The ratio of the final volume to the initial volume of the ideal gas is.
- ~~Q.2.~~ Difference between Reversible and Irreversible processes.
- Q.3. Write a short note on Brayton Cycle.
- ~~Q.4.~~ What is the difference between Otto, Diesel, and Dual cycle?
- ~~Q.5.~~ Write a short note on the Classification of Materials.
- ~~Q.6.~~ Classification of Gear Drives.
- ~~Q.7.~~ Write the difference between welding, brazing, and soldering.

PART- C

- ~~Q.1.~~ a) Write Kelvin-Planck and Clausius statements of the second law of thermodynamics with schematic diagrams. <https://www.btubikaner.com>
- b) A cyclic heat engine operates between a source temperature of 1073 K and a sink temperature of 303 K. What is the least rate of heat rejection per kW net output of the engine?
- Q.2. Draw P-V and T-S Diagram for Diesel cycle and derive expression of the efficiency of Diesel cycle.
- Q.3. Write short notes on different types of Extrusion with a schematic diagram for each.
- ~~Q.4.~~ Prove that the ratio of belt tension is given by the $T_1/T_2 = e^{\mu\theta}$
- Q.5. Draw P-V and T-S diagrams for the Rankine cycle and derive the expression of the efficiency of the Rankine cycle.

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21N508 /

B.Tech. II Sem (New Scheme) Main Exam Acad Session 2022-23

All Branch

(2FY2-08) - Computer Fundamentals & Programming

21N508 /

Time : 3 Hours

Maximum Marks: 70

Min. Passing Marks:

Instructions to Candidates:

Part – A: Short answer questions (up to 25 words) 10 * 2 marks = 20 marks. All 10 questions are compulsory.

Part – B: Analytical/Problem Solving questions 5 * 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving/ Design questions 3 * 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1 NA

2 NA

PART-A

- ✓ Q.1. What are the low-level languages? [2]
✓ Q.2. What do you mean by a base or radix of a number system? [2]
Q.3. What do you mean by nested for loop in C? [2]
✓ Q.4. Differentiate between Relational and logical operators. [2]
Q.5. How does function definition differs from function declaration? [2]
✓ Q.6. Give different ways of initialization of arrays in C language. [2]
• Q.7. Justify the statement-"Name of array can be used as a pointer". [2]
Q.8. How do you access the members of a structure? [2]
✓ Q.9. Differentiate between static and dynamic memory allocation? [2]
✓ Q.10. Describe the function fclose() and fopen (). [2]

P.T.O.

Z-352

PART-B

- ✓ Q.1 Convert the following numbers: [4]
(a) $(6498)_{10} = (?)_2 = (?)_{16}$
(b) $(4BD5)_{16} = (?)_2 = (?)_{10}$
- ✓ Q.2. Write a program in C to generate fibonacci series. [4]
- Q.3. List and explain with syntax the most common in build string handling function used in C. [4]
- Q.4. What do you mean by function prototyping? Write down the advantages of function prototyping in C. [4]
- Q.5. What are the storage classes ? Give the classification of various storage classes used in C. [4]
- Q.6. Write a program to swap two numbers using call by reference method and display the numbers before, during and after the function calling. [4]
- Q.7. What are the different modes in which a file can be opened in C? Explain with suitable example. [4]

PART- C

- Q.1. How many types of storage are normally there in the storage unit of a computer system? Give examples of each type and justify the need for each storage unit. [10]
- Q.2. Differentiate between structure and union. When is union preferred over structure? Define a structure distance having two data members: cm and mm in integer. The program enters three variables and find which distance is the largest among them. [10]
- ✓ Q.3. What is an array? Give two classification of arrays. Write a program to find greatest number in an array. [10]
- ✓ Q.4. List and explain various types of loops available in C with their syntax and suitable examples. Write a program to find the table of a number using loop. [10]
- ✓ Q.5. What is a string? How to declare and initialize a string? Write a program to copy one string to another string without using the standard library function strcpy (). [10]
