

Register Number :

Name of the Candidate :

3 6 1 2

B.E. DEGREE EXAMINATION, 2018

(COMMON TO ALL BRANCHES)

(SECOND SEMESTER)

OOPS-201. ENGINEERING MATHEMATICS - II

(for the candidates of 2016-17 and after)

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL Marks.

UNIT - I

1. (a) Solve : $(D - 2)^2 y = 8(e^{2x} + \cos 2x)$

(b) Solve by the method of variation parameters. $\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + y = e^x \log x$.

(OR)

2. (a) Solve : $\frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$.

(b) Solve : $x^2 \frac{d^2 y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^2 + 2 \log x$.

UNIT - II

3. (a) Find the unit normal vector to the surface $x^3 + y^3 + 3xyz = 3$ at the point $(1, 2, -3)$

(b) If f is a scalar point function, and \vec{g} is a vector point function, then prove that

$$\nabla \times (f\vec{g}) = \nabla f \times \vec{g} + f(\nabla \times \vec{g}).$$

(OR)

4. (a) Find the directional derivative of $\phi(x, y, z) = x^2yz + 4xz^2$ at a point $(1, 2, -1)$ in the direction of the vector $2\hat{i} + \hat{j} - 2\hat{k}$.

(b) Find the angle between the normals to surface $xy = z^2$ at the points $(1, 4, 2)$ and $(-3, -3, 3)$

UNIT - III

5. (a) Using Green's theorem, evaluate $\int_C (x^2 - y^2) dx + 2xy dy$, where C is the closed curve of the region bounded by $y^2 = x$ and $x^2 = y$.

(b) Evaluate $\iiint_V \nabla \cdot \vec{F} dv$,

if $\vec{F} = x^2 \hat{i} + y^2 \hat{j} + z^2 \hat{k}$ and v is the volume of the region enclosed by the cube $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$, $z = 1$.

(OR)

6. Verify Gauss-Divergence theorem for

$$\vec{F} = (x^2 - yz) \hat{i} + (y^2 - zx) \hat{j} + (z^2 - xy) \hat{k}$$

taken over rectangular parallelepiped bounded by $0 \leq x \leq a$, $0 \leq y \leq b$, $0 \leq z \leq c$.

UNIT - IV

7. (a) Show that $f(z) = \frac{1}{z-1}$ is analytic at $z = 1 + i$.

- (b) Find the image of $|z - 2i| = 2$ under the transformation $w = 1$.

(OR)

8. (a) If $w = u + iv$ is analytic function and $v = x^2 - y^2 + \frac{x}{x^2 + y^2}$ find u .

- (b) Find the image of the triangular region bounded by the lines $x = 1$, $y = 1$, $x + y = 1$ in the z -plane under the transformation $w = z^2$.

UNIT - V

9. (a) Evaluate $\int_C z^2 dz$ where c is the arc from A(1, 1) to B(2, 4) along $y = 3x - 2$.

- (b) Expand the function $f(z) = \frac{z}{z^2 - 3z + 2}$ in the region

- (i) $1 < z < 2$ and (ii) $|z| > 2$ as a Laurent's series.

(OR)

10. (a) Discuss the nature of the singularity of the following $f(z)$:

(i) $\frac{\sin z - z}{z^3}$

(ii) $\frac{e^{1/2}}{(z-a)^2}$

- (b) Evaluate $\int_0^{2\pi} \frac{\sin \theta}{5 + 4 \cos \theta} d\theta$

by using Contour integration.

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(COMMON TO ALL BRANCHES)

(SECOND SEMESTER)

SCLEC-202: ENGINEERING MATHEMATICS - II

November]

Maximum : 75 Marks

[Time : 3 Hours

Answer One Full Question from each Unit.**UNIT - I**

1. (a) Solve $(D^2 + 4)y = \text{Lin}2x$. (5)
 (b) Solve $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2 \text{ Lin} [\log(1+x)]$. (10)
2. Solve $\frac{dx}{dt} + 2x - 3y = t$; $\frac{dy}{dt} - 3x + 2y = e^{2t}$ (15)

UNIT - II

3. (a) Find the directional derivative of $d = x^2yz + 4xz^2 + xyz$ at $(1,2,3)$ in the direction of $xi+j-k$. (8)
 (b) If \vec{r} is the position vector of the point (x,y,z) with respect to the origin, P.T. $\nabla r^n = nr^{n-2} \vec{r}$. (7)
4. (a) Show that $\vec{F} = (6xy + z^2)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$ is irrotational vector and find the scalar potential function ϕ such that $\vec{F} = \nabla\phi$. (8)
 (b) Prove that $\text{curl}(\text{grad } \phi) = \vec{0}$. (7)

UNIT - III

5. (a) If $\vec{F} = 3xy\vec{i} - y^2\vec{j}$, Evaluate $\int_C \vec{F} \cdot d\vec{r}$ where C is the curve in the xy plane $y = 2x^2$ from $(0,0)$ to $(1,2)$. (8)
 (b) Prove that the area bounded by a simple closed curve C is given by $\frac{1}{2} \int_C (xdy - ydx)$. Find the area of the ellipse $x = a \cos\theta$ $y = b \sin\theta$. (7)
6. Verify the Gauss Divergence theorem for $E = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ over the cube bounded by $x=0, x=1, y=0, y=1, z=0, z=1$. (15)

UNIT - IV

7. (a) Prove that the real and imaginary parts of an analytic function satisfies Laplace equation. (8)
 (b) Show that $w=Cz$ is analytic everywhere and

$$\text{find } \frac{dw}{dz}. \quad (7)$$

8. (a) Find the conjugate harmonic function of $p(z)$ whose real part is $u = \frac{1}{2} \log(x^2+y^2)$. (8)
 (b) Find the image of the circle $|z-1| = 1$ in the complex plane under $w = \frac{1}{2}z$. (7)

UNIT - V

9. (a) Use Cauchy's Integral formula to
 Evaluate $\int_C \frac{z+1}{z^2+2z+y} dz$ where C is $|z+1+i|=2$. (8)
 (b) Expand

$$f(z) = \frac{2}{(2-1)(2-3)} \text{ as a Laurent's series valid in the following region } 1 < |z| < 3. \quad (7)$$

10. Evaluate $\int_0^{2\pi} \frac{d\theta}{13+5 \operatorname{Lin} \theta}$ using contour integration. (15)

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Register Number:

3613

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B.E. DEGREE EXAMINATION, 2018

(COMMON TO ALL BRANCHES)

(SECOND SEMESTER)

OOBS-202: APPLIED PHYSICS - II

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit (5 × 15 = 75)

UNIT - I

1. a) List out the properties of LASER. (5)
- b) Describe the construction and working of semiconductor laser. (10)
2. a) Difference between step index fibers and graded index fibers. (8)
- b) With a neat sketch of a schematic diagram, describe the various components of a fibre optic communication system and explain their functions. (7)

UNIT - II

3. a) Describe the different types of polarization. (5)
- b) Derive an expression for the internal electric field in dielectrics and hence deduce the Clausius-Mossatti relation. (10)
4. a) What is Meissner effect? List out the properties of superconductivity. (7)
- b) Write detailed notes on high temperature superconductors and its applications. (8)

UNIT - III

5. a) Describe the different types of nanomaterials and its applications. (8)
- b) Describe the synthesis of nanomaterials by sol-gel method. (7)
6. a) Enumerate the applications of carbon nanotubes. (8)
- b) Distinguish between top-down approach and bottom up approach. (7)

UNIT - IV

7. a) Define De Broglie hypothesis. (2)
- b) Derive Schrodinger time dependent wave equation. (9)
- c) An electron has a speed of 600m/s with an accuracy of 0.005%. Calculate the certainty with which its position can be located. (4)
8. a) Derive an expression for the particle in a Box. (10)
- b) Explain dual nature of electron. Define group velocity. (5)

UNIT - V

9. a) Describe solar cells, solar battery and solar water heater. (10)
- b) Describe the energy conversion by wind energy. (5)
10. a) Describe the different sources of energy. (8)
- b) Describe the classification of biogas plants. (7)

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B.E. DEGREE EXAMINATION, 2018

(COMMON TO ALL BRANCHES)

(SECOND SEMESTER) .

00 ES 204. BASIC ENGINEERING

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit.

ALL questions carry EQUAL marks.

PART - A

(CIVIL ENGINEERING)

(25)

UNIT - I

1. (a) Name the different types of cements and their uses. (5)
- (b) List out the different stages involved in the manufacture of bricks and explain them. (8)
2. (a) As per the National Building Code write the different types of buildings and their uses. (8)
- (b) Define the following : (5)
 - (i) Foundations
 - (ii) Lintel
 - (iii) Beams
 - (iv) Columns
 - (v) Sunshade

UNIT - II

3. (a) Name the classifications of surveying. (3)
- (b) List out the different instruments used in chain surveying. (3)
- (c) Write important points about the following : (6)
 - (i) Foundation.
 - (ii) Lintel.
 - (iii) Beams.
4. (a) Name the classifications of roads and components of roads. (6)
- (b) (i) List out the classifications of bridges. (3)
- (ii) Write a short note on septic tank. (3)

PART - B

(MECHANICAL ENGINEERING)

(25)

UNIT - III

5. (a) With neat sketch, explain any one fire tube boiler in detail. (7)
- (b) Explain the working of a reaction turbine. (6)

6. Explain the following : (13)
- (a) Fusible plug. (b) Water level indicator.. (c) Super heater.
(d) Economiser.

UNIT - IV

7. With neat sketch, explain the various operations performed in lathe. Also, discuss the specification of a centre lathe. (12)
8. (a) Explain the working principle of arc welding process. (6)
(b) Define soldering. Discuss the types of soldering. (6)

PART - C

(*ELECTRICAL ENGINEERING*) (25)

UNIT - V

9. With the help of diagrams, explain the construction and working principle of permanent magnet moving coil instruments. Obtain an expression for its deflecting torque. (13)
- 10.(a) Explain the basic nature of the induced emf in the armature of a DC machine. (5)
(b) A 200V DC shunt motor take a total current of 100A and runs at 750 rpm. The resistance of the armature winding and of shunt field winding is 0.1Ω and 40Ω respectively. Find the torque developed by the armature. (8)

UNIT - VI

11. (a) Briefly explain about depletion region and barrier voltage of a PN junction. (5)
(b) With necessary diagram, describe the characteristics of a forward and a reverse biased PN junction diode. (7)
12. (a) Draw and explain the operation of following flip-flops :
RS flip-flops using NOR gate. (ii) D flip-flop using NAND gate. (6)
(b) Draw the logic symbol of OR , NAND, NOT gate and explain its logic operation. (6)
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3626

**B.E. DEGREE EXAMINATION, 2018
(COMMON TO ALL BRANCHES)
(SECOND SEMESTER)**

SCLEC-206: ENVIRONMENTAL STUDIES

November]

[Time : 3 Hours

Maximum : 75 Marks

Answer any ONE FULL question from each unit (5 × 15 = 75)

UNIT - I

1. a) Enumerate and explain the various effects of deforestation. (8)
- b) Discuss the environmental effects of extracting and using the mineral resources. (7)
2. a) Explain in effects od dams on forest and tribal people. (8)
- b) Discuss the problems of pesticide on modern agriculture. (7)

UNIT - II

3. With a neat sketch, explain about the energy and nutrient flow through ecosystem. (15)
4. Explain in detail about types and characteristic features of grass land ecosystem. (15)

UNIT - III

5. a) What is meant by value of biodiversity? Explain different values of biodiversity. (9)
- b) Write brief about man and wild life conflicts. (6)

6. Give an account of conservation in biodiversity in detail. (15)

UNIT - IV

7. Define soil pollution. Explain in detail about the effects and control measures of soil pollution. (15)
8. What is an earthquake? Enumerate its effects. What precautionary measures to be taken to mitigate their disaster? (15)

UNIT - V

9. a) Explain the various measures taken by the government of India to control the population growth. (10)
- b) Explain in detail the effects of climate change on the environment. (5)
10. a) Explain with neat sketch about rain water harvesting. (10)
- b) Write short notes on: (i) Value education (ii) Human rights. (5)

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