

FACULTY OF ENGINEERING
B.E. I-Year (Backlog) Examination, November / December 2018

Subject : Engineering Physics

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (25 Marks)

- 1 Distinguish between Spontaneous and Stimulated emission of radiation process. (3)
- 2 Two Nicol prisms are crossed to each other, now one of them is rotated through 60° . What percentage of unpolarised light will pass through system? (2)
- 3 Explain the properties of wave function and its physical significance. (3)
- 4 Mention few applications of optical fibres. (2)
- 5 Define Atomic radius, co-ordination number in crystal systems? (3)
- 6 Explain the concept of hole in semiconductors? (2)
- 7 Explain the concept of Magnetic Domains. (2)
- 8 State and explain the Meissner effect. (3)
- 9 What are the advantages of thin films over bulk materials? (2)
- 10 Why Nano materials are so significant? (3)

PART – B (50 Marks)

- 11 (a) Discuss the formation of Newton's rings and deduce the expression for determination of wavelength by using Newton's rings. (5)
 (b) Discuss the construction and working of Rubu Laser system. (5)
- 12 (a) Deduce the expression for the Maxwell Boltzmann distribution law. (5)
 (b) Describe the Double Crucible method to fabricate an optical fibre. (5)
- 13 (a) Obtain an expression for the equilibrium concentration of Frenkel defects crystal. (6)
 (b) Explain the classification of Metals, Semiconductors and insulators on the basis of Band theory. (4)
- 14 (a) Discuss the Weiss theory of ferromagnetism. (5)
 (b) Explain Type-I and Type-II Superconductors. Write a note on applications of Super conductors? (5)
- 15 (a) Explain any one Thermal Evaporation Technique for thin film formation with neat diagram. (5)
 (b) Discuss the construction and working of Scanning Electron Microscope. (5)
- 16 (a) Describe the preparation of nanomaterials by Sol-Gel process. (5)
 (b) Discuss the frequency and temperature dependence of Dielectric polarization. (5)
- 17 (a) What is Grating? Deduce the expression for various maxima in diffraction grating. (5)
 (b) Deduce the Schrodinger's Time independent wave equation. (5)

FACULTY OF ENGINEERING & TECHNOLOGY

**BE/B. Tech (Bridge Course) II Semester (Backlog) Examination,
November/ December 2018**

Subject: Mathematics

Time: 3 Hours

Max. Marks: 75

Note: Answer all questions from Part A & any five questions from Part B

PART-A (25 Marks)

1. Find the mean of the first n Natural numbers. 2
2. Three coins are tossed simultaneously. Find the possibility that at least two heads occur. 3
3. State Rolle 's Theorem. 2
4. Find the Taylor series expansion of $f(x) = \sin x$ about $x = \frac{\pi}{2}$ 3
5. Evaluate $\int \frac{\cos x}{\sin x} dx$ 2
6. Evaluate $\int_0^1 \int_1^2 x dx dy$ 3
7. If $\vec{r} = xi + yj + zk$ find $\text{div}(\vec{r})$ and $\text{curl}(\vec{r})$ 2
8. Find the unit normal vector to the surface $x^2 + y^2 + z^2 = 3$ at $(1,1,1)$ 3
9. State the relation between Beta and Gamma functions. 2
10. Find the value of $\Gamma\left(\frac{5}{2}\right)$ 3

Part – B(50 Marks)

11. a) Find the median and mode for the following distribution. 5

x	1	2	3	4	5	6	7	8	9	10	11	12
f(x)	3	8	15	23	35	40	32	28	20	45	14	6

- b) A bag contains 7 white, 5 black and 4 red balls. If two balls are drawn at random, find the probability that (i) both the balls are black and (ii) one ball is black and the other is red. 5

12. a) State and prove Lagrange's mean value theorem 5

- b) Find the evolute of the parabola $x^2 = 4ay$ 5

contd...2..

-2-

13. a) Evaluate $\int_0^1 x^3 e^x dx + \int_0^{\frac{\pi}{2}} \sin x \cos 3x dx$ 5

b) Evaluate $\int_0^{\frac{\pi}{2}} \int_0^{\frac{\pi}{4}} \int_0^a r^2 \sin \theta dr d\theta d\phi$ 5

14. a) Show that $\vec{v} = 3x^2 yi + (x^3 - 2yz^2) j + (3z^2 - zy^2 z) k$ is irrotational but not solenoidal. 5

b) Use Gauss's divergence theorem to evaluate $\iiint_S \vec{F} \cdot \hat{n} ds$, where $\vec{F} = 4xzi - y^2 j + yzk$

and S is the surface of the cube bounded by the planes $x = 0, x = 1, y = 0, y = 1, z = 0$ and $z = 1$. 5

15. a) Show that $S(m+1, n) + S(m, n+1) = S(m, n)$ 5

b) Define Error function and complementary Error functions. Show that $\text{erf}(x) + \text{erfc}(x) = 1$ 5

16. a) If $P(A \cap \bar{B}) = \frac{1}{4}$ and $P(A \cup B) = \frac{3}{4}$, find (i) P(B) and (ii) P(A) 5

b) Find the envelope of the family of curves $y = 3cx - c^3$ 5

17. a) Show that $\nabla^2 r^n = n(n+1)r^{n-2}, r = |\vec{r}|, \vec{r} = xi + yi + zk$ 5

b) Evaluate $\int_0^{\infty} \sqrt{x} e^{-x^3} dx$ using Gamma function. 5
