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20/01/22

OP JINDAL UNIVERSITY, RAIGARH (C.G.)



END SEMESTER BACKLOG EXAMINATION, JANUARY-2022

Course : B.Tech

Time : 03 Hrs

Semester: 2nd

Max. Marks : 100

Subject Code: SOE-B-FY201

Subject: Mathematics-II

Note: Section A : All Questions are compulsory. [10 x 02 marks]

Section B : Answer any 8 questions. [08 x 05 marks]

Section C : Answer any 5 questions [05 x 08 marks]

Q. No.	Section [A]	CO
Q1 a)	Define Integrating factor with example.	CO1
Q1 b)	Solve $(D - 2)^2 = 0$.	CO3
Q1 c)	Define general solution, particular solution.	CO3
Q1 d)	Define order and degree of the differential equation	CO1
Q1 e)	Define Clairaut's equation.	CO1
Q1 f)	Define even and odd function with example.	CO7
Q1 g)	Write the formulae for Fourier Sine Series and Fourier Cosine Series.	CO7
Q1 h)	Find the particular integral of $\frac{d^2y}{dx^2} - a^2y = e^{ax}$	CO5
Q1 i)	Solve the following equation $\frac{\partial^2 z}{\partial x^2} = xy$.	CO6
Q1 j)	Write the formula for two dimensional Laplace equation and three dimensional Laplace equation..	CO9

Q. No.	Section [B]	CO
Q2 a)	Using the method of variation of parameters, solve $y'' - 2y' + y = e^x \log x$	CO3
Q2 b)	Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$	CO1
Q2 c)	Employing the appropriate method to solve the equation $y = 2px - p^2$.	CO2
Q2 d)	Solve the following simultaneous equations $\frac{dx}{dt} + 2y = e^t$ $\frac{dy}{dt} - 2x = e^{-t}$	CO4
Q2 e)	Expand $f(x) = x$ as a Fourier series $(0, \pi)$.	CO7

Q2 f)	Obtain the constant term and the coefficient of the first sine and cosine terms in the Fourier expansions of y from the given data: $x: 0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5$ $y: 4 \quad 8 \quad 15 \quad 7 \quad 6 \quad 2$	CO8
Q2 g)	Solve $\frac{\partial^2 z}{\partial y \partial x} = xy$.	CO5
Q2 h)	Solve $(p^2 + q^2)z^2 = x^2 + y^2$	CO5
Q2 i)	Solve $(D^2 + DD' - 6D'^2)z = y \sin x$	CO5
Q2 j)	Solve the equation $3 \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} = 0, u(x,0) = 4e^{-x}$.	CO10

Q. No.	Section [C]	CO
Q3 a)	Solve the equation $\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 4y = 3 \sin x + 4 \cos x, y(0) = 1, y'(0) = 0$	CO2
Q3 b)	Solve $y(xy + 2x^2 y^3)dx + x(xy - x^2 y^2)dy = 0$	CO1
Q3 c)	Find the Fourier series of the function $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \sin x, & 0 < x < \pi \end{cases}$.	CO7
Q3 d)	Find the Fourier series of the function $f(x) = \sqrt{1 - \cos x}, 0 < x < 2\pi$. Hence show that $\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \dots = \frac{1}{2}$.	CO7
Q3 e)	Solve $\frac{\partial^2 y}{\partial x^2} - 3 \frac{\partial y}{\partial x} + 2y = xe^{3x} + \sin 2x$.	CO5
Q3 f)	Solve $(D^4 - 1)y = e^x \cos x$.	CO6
Q3 g)	Derive the solution of wave equation.	CO9

Course Code: SOE-B-ME202

O P JINDAL UNIVERSITY

BTECH II Semester Backlog Examinations

ENGINEERING MECHANICS

MECHANICAL ENGINEERING



Time: 3 Hrs.

Max. Marks: 100

Answer any one question from each unit

All questions carry equal marks

M CO KL

Section-A

1	a.	Define Rigid and deformable body.	2	1	1
	b.	What is static body?	2	1	1
	c.	Write Static Equilibrium conditions?	2	2	1
	d.	State Varignon's theorem.	2	2	1
	e.	Write short notes on Lami's theorem.	2	3	1
	f.	Two forces of 30N and 60N are acted at an angle 120° , find the resultant force.	2	3	1
	g.	Three equal concurrent and coplanar forces are in static equilibrium. Find the angle between each force.	2	4	1
	h.	Define cone of friction.	2	4	1
	i.	Define a perfect truss.	2	5	1
	j.	What are support reactions?	2	5	1

Section-B:

Unit-I

2	a.	Two forces act an angle of 120° . The bigger force is of 40 N and the resultant is perpendicular to the smaller one. Find the smaller force	6	1	2
	b.	Four forces of 8 N, 12 N, 15N and 20 N magnitudes are acting on a point at 30° , 70° , 120° and 150° angles respectively from a fixed direction. Find magnitude and direction of their resultant force.	10	1	3
	OR				
c.	Pull of 10 N, 20 N, 30 N, 40 N and 50 N are acting at a point. The inclinations of these forces with the axis OX are 30° , 120° , 180° , 225° and 300° . Find the magnitude and direction of the resultant force.	10	1	3	

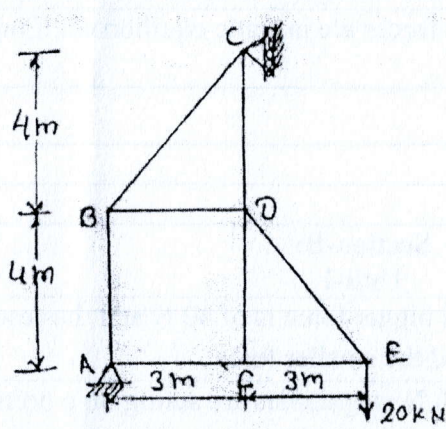
Unit-II

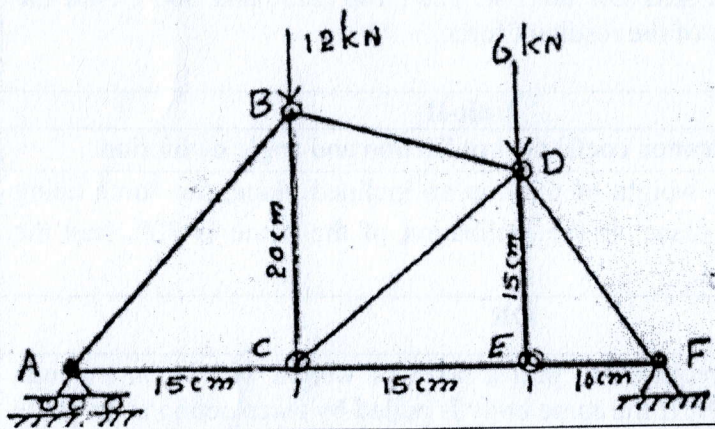
3	a.	Estimate relationship between coefficient of friction and angle of friction.	6	2	2
	b.	A force of 40N pulls a weight of 60N up an inclined plane, the force being applied parallel to the plane. If the inclination of the plane is 30° . find the coefficient of the friction.	10	2	3
	OR				
c.	The horizontal forces required to pull a body of weight 100 N on a rough horizontal surface is 20N. If the same body is pulled by force acting at an angle 15° with the horizontal determine the magnitude of the force.	10	2	3	

Unit-III

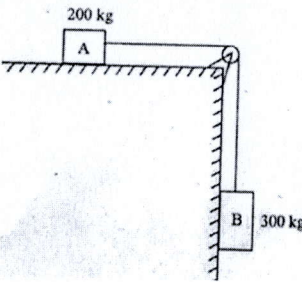
4	a.	Define moment of inertia. State and prove the perpendicular axis theorem.	6	3	2
	b.	An I section has the following dimensions in mm units: Bottom flange = 300×100 Top flange = 150×50 Web = 300×50 , find I_{xx} .	10	3	3
	OR				
	c.	A T-section has $120\text{mm} \times 15\text{mm}$ flange and $180\text{mm} \times 15\text{mm}$ web. Find I_{xx} .	10	3	3

Unit-IV

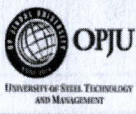
5	a.	What do you mean by parallel force systems? Give 2 examples.	6	4	2
	b.	Find the nature and magnitude of the forces in all the member of the truss shown below: 	10	4	3
	OR				

5	c.	Use method of section and find the forces in the members BD, CD and CE of truss. 	10	4	3
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UNIT-V

6	a.	Explain D'Alembert's principle. Illustrate this principle by taking an example of motion of two bodies connected by a string.	6	5	2
	b.	An elevator has a downward acceleration of 1m/s^2 . What pressure will be transmitted to the floor of the elevator by a man weighing 500N travelling in the lift? Find the pressure if the elevator had an upward acceleration of 1m/s^2 .	10	5	3
	OR				
	c.	<p>Two blocks are joined by an inextensible cable. If the system is released from rest, determine the velocity of block A after it has moved 2m. Assume μ between block A and horizontal plane is 0.25.</p> <div style="text-align: center;">  </div>	10	5	3

25/01/23
101

Course Code: SOE-B-FY202						
O P JINDAL UNIVERSITY				 <small>UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT</small>		
B.Tech. II Semester Lateral Entry Examinations						
PHYSICS-II						
(Offered to B.Tech.)						
Time: 3 Hrs.		Max. Marks: 100				
Answer any one question from each unit						
All questions carry equal marks						
				M	CO	KL
Section-A						
1	a.	Write properties of X-rays.	2	CO1	K1	
	b.	What is nuclear fussion? Give example	2	CO1	K1	
	c.	Write down formulae of velocity of addition.	2	CO2	K1	
	d.	What is Gauss law?	2	CO3	K1	
	e.	Give the physical significance of divergence of a vector field.	2	CO3	K1	
	f.	Give physical significance of wavefunction.	2	CO4	K1	
	g.	Write down the wavefunction for a free particle.	2	CO4	K1	
	h.	What is the creationist theory on origin of universe?	2	CO4	K1	
	i.	What is time dilation?	2	CO2	K1	
	j.	Photon has rest mass zero. Then how does photon has energy?	2	CO2	K1	
Section-B:						
Unit-I						
2	a.	Describe the origin of characteristics X-rays using suitable diagrams. Differentiate between the continuous and characteristics X-rays.	10	CO1	K3	
	b.	Discuss properties of nuclear force.	6	CO1	K2	
OR						
3	a.	C-N cycle and P-P cycle for stellar energy.	10	CO1	K3	
	b.	Derive Bragg's relation $2d \sin\theta = n\lambda$.	6	CO1	K2	
Unit-II						
4	a.	Derive $E^2 = m_0^2 c^4 + p^2 c^2$	10	CO2	K3	
	b.	Discuss inertial and non-inertial frames of references with examples.	6	CO2	K2	
OR						
5	a.	Describe Michelson-Morley experiment and explain its negative results.	10	CO2	K3	
	b.	Suppose an electron is moving with velocity v. Calculate the value of v if the kinetic energy of the particle is equal to double of its rest mass energy.	6	CO2	K2	
Unit-III						

6	a.	Write down Maxwell's equations for conducting medium and find out the expression of phase velocity and skin depth.	10	CO3	K3
	b.	Write down the Maxwell's equations in differential and integral forms.	6	CO3	K2
OR					
7	a.	Derive Maxwell's third and fourth equations in differential forms.	10	CO3	K3
	b.	Using Maxwell's equations, prove that electromagnetic waves are transverse waves.	6	CO3	K2
Unit-IV					
8	a.	Consider particle in finite 1-D box of length L and derive the expressions for wavefunctions. Sketch the wavefunctions of ground state, first excited state and second excited state.	10	CO4	K3
	b.	Describe phase and group velocity.	6	CO4	K2
OR					
9	a.	Consider a particle confined in an one dimensional box of length a. Write down the wavefunction of ground state. Determine the probability of finding the particle for $0 < x < a$.	10	CO4	K3
	b.	Prove that group velocity is equal to the particle velocity.	6	CO4	K2
UNIT-V					
10	a.	Describe steady state theory and the pulsating theory.	10	CO4	K3
	b.	Discuss evidences of big bang theory.	6	CO4	K2
OR					
11	a.	Discuss Hawking's theory about universe.	6	CO4	K2
	b.	How does large hadron collider (LHC) work?	10	CO4	K3

Course Code: SOE-B-FY202

O P JINDAL UNIVERSITY**B.Tech. II Semester Lateral Entry Examinations****PHYSICS-II**

(Offered to B.Tech.)

**Time: 3 Hrs.****Max. Marks: 100**

Answer any one question from each unit

All questions carry equal marks

M CO KL**Section-A**

1	a.	Write properties of X-rays.	2	CO1	K1
	b.	What is nuclear fussion? Give example	2	CO1	K1
	c.	Write down formulae of velocity of addition.	2	CO2	K1
	d.	What is Gauss law?	2	CO3	K1
	e.	Give the physical significance of divergence of a vector field.	2	CO3	K1
	f.	Give physical significance of wavefunction.	2	CO4	K1
	g.	Write down the wavefunction for a free particle.	2	CO4	K1
	h.	What is the creationist theory on origin of universe?	2	CO4	K1
	i.	What is time dilation?	2	CO2	K1
	j.	Photon has rest mass zero. Then how does photon has energy?	2	CO2	K1

Section-B:**Unit-I**

2	a.	Describe the origin of characteristics X-rays using suitable diagrams. Differentiate between the continuous and characteristics X-rays.	10	CO1	K3
	b.	Discuss properties of nuclear force.	6	CO1	K2

OR

3	a.	C-N cycle and P-P cycle for stellar energy.	10	CO1	K3
	b.	Derive Bragg's relation $2d \sin\theta = n\lambda$.	6	CO1	K2

Unit-II

4	a.	Derive $E^2 = m_0^2 c^4 + p^2 c^2$	10	CO2	K3
	b.	Discuss inertial and non-inertial frames of references with examples.	6	CO2	K2

OR

5	a.	Describe Michelson-Morley experiment and explain its negative results.	10	CO2	K3
	b.	Suppose an electron is moving with velocity v. Calculate the value of v if the kinetic energy of the particle is equal to double of its rest mass energy.	6	CO2	K2

Unit-III

6	a.	Write down Maxwell's equations for conducting medium and find out the expression of phase velocity and skin depth.	10	CO3	K3
	b.	Write down the Maxwell's equations in differential and integral forms.	6	CO3	K2
OR					
7	a.	Derive Maxwell's third and fourth equations in differential forms.	10	CO3	K3
	b.	Using Maxwell's equations, prove that electromagnetic waves are transverse waves.	6	CO3	K2
Unit-IV					
8	a.	Consider particle in finite 1-D box of length L and derive the expressions for wavefunctions. Sketch the wavefunctions of ground state, first excited state and second excited state.	10	CO4	K3
	b.	Describe phase and group velocity.	6	CO4	K2
OR					
9	a.	Consider a particle confined in an one dimensional box of length a. Write down the wavefunction of ground state. Determine the probability of finding the particle for $0 < x < a$.	10	CO4	K3
	b.	Prove that group velocity is equal to the particle velocity.	6	CO4	K2
UNIT-V					
10	a.	Describe steady state theory and the pulsating theory.	10	CO4	K3
	b.	Discuss evidences of big bang theory.	6	CO4	K2
OR					
11	a.	Discuss Hawking's theory about universe.	6	CO4	K2
	b.	How does large hadron collider (LHC) work?	10	CO4	K3

OP JINDAL UNIVERSITY, RAIGARH (C.G.)



END SEMESTER (BACKLOG) EXAMINATION, JANUARY-2023

Course: **B. Tech.**

Time: **02 Hrs.**

Semester: **II**

Max. Marks: **50**

Subject Code: **SOE-B-FY207**

Subject: **Environmental Studies**

Note: Section A: All Questions are compulsory [05 x 02 marks]

Section B: Answer any 4 questions [04 x 04 marks]

Section C: Answer any 3 questions [03 x 08 marks]

Q. No.	Section [A]	CO
Q1 a)	Define productivity.	1
Q1 b)	State the importance of Biodiversity.	2
Q1 c)	Define Green House Effect.	1
Q1 d)	What is the objectives of Tertiary Treatment of wastewater?	3
Q1 e)	What is 4R Strategy in SWM?	3

Q. No.	Section [B]	CO
Q2 a)	Classify consumers. Give example of each class.	1
Q2 b)	Differentiate between renewable and non-renewable resources. Give example	1
Q2 c)	What are primary air pollutants? Give example	1
Q2 d)	Write the importance of SWM.	4
Q2 e)	Define Sustainable Development. Write two important characteristics of Indicators of SD.	5
Q2 f)	Define Food chain. Discuss its types with suitable example.	1
Q2 g)	What do you mean by Climax Community? How to identify it?	1
Q2 h)	State briefly the impacts of population explosion.	4

Q. No.	Section [C]	CO
Q3 a)	What is the importance of Ozone layer in Stratosphere? Discuss the reason and mechanism of its depletion.	3
Q3 b)	What do you mean by Bio-diversity? Discuss various Threats & Conservation techniques.	4
Q3 c)	Write short notes on: a. Acid Rain	3

	b. BOD and its measurement	
Q3 d)	Write notes on: i. Single channel energy flow model ii. Preliminary treatment of wastewater	4
Q3 e)	What is soil pollution? Discuss briefly their effect on human health and strategies of protecting soil.	4
Q3 f)	Write notes on: a. Egg of Sustainability model of SD b. Family Welfare Programmes	4, 5

Course : **B. Tech**

Time : **03 Hrs**

Semester: **II**

Branch : Section B and C

Max. Marks : **100**

Subject Code: **SOE-B-FY208**

Subject: **Introduction to Artificial Intelligence**

Note: Section A : All Questions are compulsory. [10 x 02 marks]

Section B : Answer any 8 questions. [08 x 05 marks]

Section C : Answer any 5 questions [05 x 08 marks]

Q. No.	Section [A]	CO
Q1 a)	What is CNN.	2
Q1 b)	Define informed search	1
Q1 c)	What are the properties of queue?	1
Q1 d)	Define DFS	2
Q1 e)	What is the difference between data and information?	2
Q1 f)	Define Narrow AI	1
Q1 g)	What is data validation?	3
Q1 h)	Draw and annotate a multi-layer feed-forward neural network.	4
Q1 i)	What is the meaning of weight in neural network?	4
Q1 j)	What is confusion matrix?	3

Q. No.	Section [B]	CO
Q2 a)	What is Naïve Bayes? Discuss in detail.	1
Q2 b)	Explain K-fold cross validation technique with the help of a neat diagram.	3
Q2 c)	Draw and explain the structure of a biological neuron in the context of ANN	4
Q2 d)	Write a short note on weather forecasting system.	5
Q2 e)	What is activation function? Discuss any two types of activation functions	4
Q2 f)	Write a note on MNIST dataset.	3
Q2 g)	What are the types of learning? i.e., supervised, unsupervised and reinforcement.	1
Q2 h)	What is a recommender system? How does it work?	2
Q2 i)	Discuss any two real life examples of AI based systems that we use in our daily life.	2
Q2 j)	Describe the components of an AI system.	1

Q. No.	Section [C]	CO
Q3 a)	Write a detailed note on A* search technique used in AI	1
Q3 b)	Describe Breadth first search algorithm with the help of an example	1
Q3 c)	Describe Decision Tree algorithm with the help of an example	2
Q3 d)	What are the different data validation techniques?	3
Q3 e)	Discuss various applications of Deep Learning.	5
Q3 f)	Describe different architectures of Artificial Neural Network?	4
Q3 g)	Write a detailed note on smart home system. Discuss about all it's components.	5

01/02/23

11

Course Code: SOE-B-FY-204

O P JINDAL UNIVERSITY

B. Tech. II Semester Backlog Examinations

Basics of Civil Engineering

(Offered to CE, ME, EE, MME)



Time: 03 Hrs.

Max. Marks: 100

Answer any one question from each unit

All questions carry equal marks

M CO KL

Unit-I (20 marks)

1	a.	Explain the "manufacturing process of bricks (clay bricks)".	10	2	2
	b.	What are the various types of cement used for construction?	10	2	1
OR					
2	a.	Write down properties of Reinforced Cement Concrete? Give ten examples of uses of Reinforced Cement Concrete.	10	1	2
	b.	Describe the procedure of specific gravity and water absorption test on coarse aggregates.	10	1	2

Unit-II (20 marks)

3	a.	Illustrate the different components of the residential buildings through a neat sketch?	10	2	2
	b.	Write short notes on any eight different components of the residential building.	10	2	2
OR					
4	a.	What are the smart city features?	10	3	1
	b.	Why to opt for smart building?	10	3	1

Unit-III (20 marks)

5	a.	What are the various fields of engineering in Transportation? Write short notes on each of them.	10	2	1
	b.	Classify roads in India based on the recommendation of IRC. Write short notes on each of them.	10	2	2
OR					
6	a.	Write a note on the Traffic Characteristics?	10	2	2
	b.	What is the usefulness of the Traffic flow study?	10	2	1

Unit-IV (20 marks)

7	a.	Write notes on various types of foundations.	10	2	2
	b.	What are different methods used for improving the bearing capacity of soil?	10	2	1
OR					
8	a.	Classify of pile foundation on basis of the materials and composition.	10	2	2
	b.	Classify of pile foundation on basis of their function.	10	2	2

UNIT-V (20 marks)

9	a.	Summarize the application of drone technology in the construction industry?	10	3	2
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	b.	Why choose modular construction? Write down aims and basics of modular construction?	10	3	1
OR					
10	a.	Summarize the benefits of cloud collaboration?	10	3	2
	b.	Explain the benefits of using AR in an engineering environment?	10	3	2
