Total No. of Pages:1

Roll No. Q.48

THIRD SEMESTER **B.Tech. [EP]**

END SEMESTER EXAMINATION ***November-2017***

EP-203: MATHEMATICAL PHYSICS

Time: 3.00 Hours ***Max. Marks: 50***

Note : Answer any **FIVE** questions.
Assume suitable missing data, if any.

1.[a] If S is a closed surface of X-Y plane bounded by the closed curve C and if M and N are continuous functions of x and y having continuous derivatives in S, then

$$\oint_C (Mdx + Ndy) = \iint_S \left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right) dxdy \quad \textbf{(6)}$$

[b] Verify Green's theorem in the plane for $\oint_C (3x^2 - 8y^2)\, dx + (4y - 6xy)dy$. Where C is the boundary of the region defined $y = \sqrt{x}$ and $y = x^2$ **(4)**

2.[a] Define coefficient of thermal expansion and discuss the application of tensor analysis to thermal expansion. **(6)**

[b] What is a mixed tensor of second rank? Define kronecker delta and prove that δ_q^p is a mixed tensor of the second rank. **(4)**

3.[a] State and prove the Cauchy Residue Theorem. **(6)**

[b] Find the modulus and principal argument of the complex number $\frac{1+2i}{1-(1-i)^2}$ **(4)**

4. Show that the real and imaginary parts of the function $w = log\ z$ satisfy the Cauchy Riemann equations when z is not zero. Find its derivative. **(10)**

5. Derive the solution for the equation of the rectangular vibrating membrane, when the displacement of the membrane from its equilibrium position *(u)* is zero at its four edges $x=0$, $x=a$, $y=0$, $y=b$ for all t and also the displacement *(u)* is $f(x,y)$ *for* $t=0$. **(10)**

6. Use Runge-Kutta method to find y when $x=1.2$ in steps of 0.1 given that

$$y' = x^2 + y^2 \text{ and } y(1) = 1.5 \quad \textbf{(10)}$$

Total No. of Pages 2 *Roll No. 2018*

THIRD SEMESTER **B.Tech. (EP)**

END SEMESTER EXAMINATION ***(Nov.-2017)***

EP- 205 Classical & Quantum Mechanics

Time: 3:00 Hours ***Max. Marks: 50***

Note: Q 1 is compulsory. All questions carry equal Marks.
Assume suitable missing data, if any.

Q 1 a) Prove the statement, "A function whose Poisson bracket with Hamiltonian vanishes is a constant of motion".

OR

Calculate the eccentricity of the orbit in terms of maximum 'v_{max}'and minimum 'v_{min}' velocities of a satellite.

b) The wave packet for 1-D motion of a free particle of mass m is,

$$\psi(x,t) = (2\pi)^{-\frac{1}{4}}\left[a + \frac{i\hbar t}{2ma}\right]^{-\frac{1}{2}} exp\left[\frac{-x^2}{4a^2+\frac{2i\hbar t}{m}}\right]$$ Show that it is properly normalized.

c) A linear harmonic oscillator is in the first excited state (n=1). At what point is its probability density maximum? What is the value of maximum probability density?

d) Write down the Lagrange's equation of motion for a particle of mass 'm' falling freely under gravity near the surface of earth.

Q 2 a). What is d'Alembert's principle? Derive Lagrange's equation of motion from it.

b). Explain the concept of Phase Space. Obtain the Hamiltonian and Hamilton's canonical equations for the motion of a non-relativistic charged particle of mass 'm', charge 'q' in an electromagnetic field.

Q 3 a). Discuss the motion of a particle under a central attractive force inversely proportional to the square of the distance from the center of force field. Discuss the nature of orbits.

b). Discuss the stability condition for the central force field if the form of potential V(r) is ar^{n-1}, a being a constant and centrifugal energy is $V_c(r)$ is br^{-2}, being positive constant.

Q 4 a). Find the value of angular momentum operator $\hat{L}$ in spherical polar coordinates. Hence determine whether or not $\sin(m\varphi)$ is its eigenfunction.

b). What ratio of $\frac{E}{V_0}$ is necessary for scattering from a 1-D step potential, so that the transmission probability is 50%?

Q 5 a). Consider the infinite square well defined by $\mathbf{V(x) = 0\ for\ 0 \leq x \leq a}$

$= \infty$ **otherwise.**

Using the first order perturbation theory, calculate the energy of the first state (n=1) of the potential well if a portion defined by $V(x) = V_0 \frac{x}{a}$ where V_0 is a small constant, with $0 \leq x \leq a$ being sliced off.

b). A system in an unperturbed state n is suddenly subjected to a constant perturbation H′(r) which exists during $0 \rightarrow t$. Find the probability for transition from state n to state k and show that it varies simple harmonically with angular frequency $\frac{E_k - E_n}{2\hbar}$ and amplitude $4\left|H'_{kn}\right|^2 (E_k - E_n)^2$.

Total No of Pages : 02

Roll No. 018

THIRD SEMESTER

B.Tech (Engineering Physics)

END SEMESTER EXAMINATION

Paper Code ME-251

Subject: ENGINEERING MECHANICS

Time: 3 Hrs.

Max Marks. 50

Note: (i) Answer any Five Questions. (ii) Assume missing data if any.

Q 1. Write short note on following: (2.5x4 = 10)

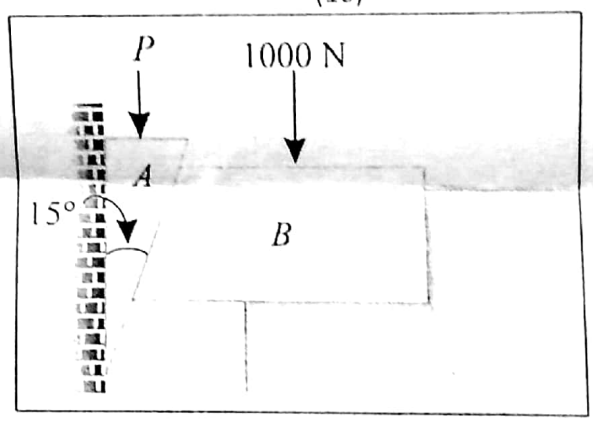
i. Free Body Diagram.

ii. Truss and Frame.

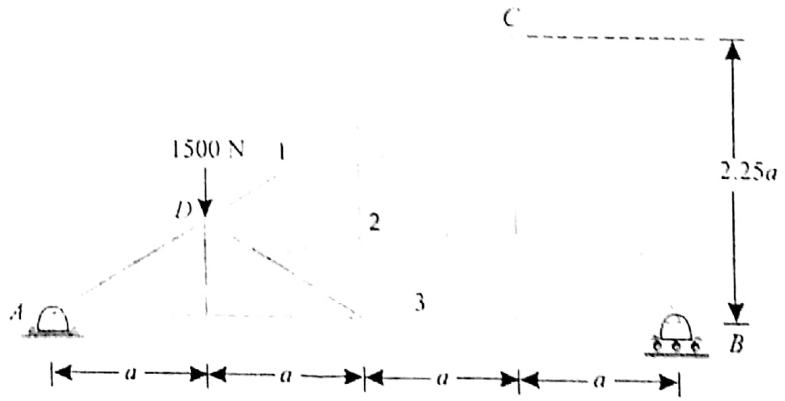
iii. Centre of Gravity and Centre of Mass.

iv. Mechanical Efficiency.

Q 2. A 15° wedge (A) has to be driven for tightening a body (B) loaded with 1000 N weight as shown in Figure 1. If the angle of friction for all the surfaces is 14°, find graphically the force (P), which should be applied to the wedge. Also check the answer analytically. (10)

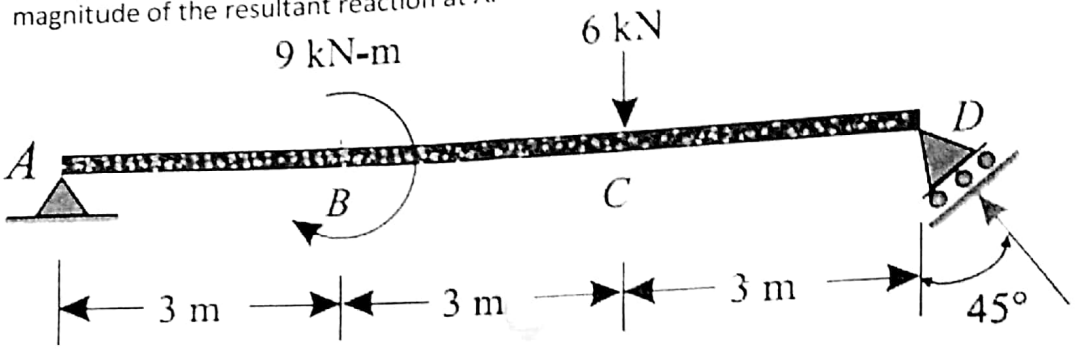


Q 3. An inclined truss shown in following figure is loaded. Determine the nature and magnitude of the forces in the members 1, 2 and 3. (10)

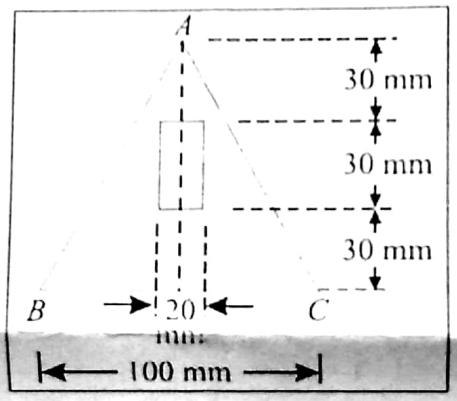


Q 4. Following figure shows as beam ABCD simply supported on a hinged support at A and at D on a roller support inclined at 45° with the vertical. Determine the horizontal and

vertical components of reaction at support A. Show clearly the direction as well as the magnitude of the resultant reaction at A. (10)

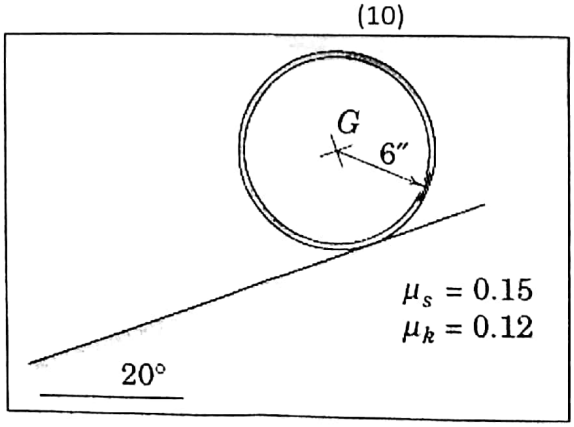


Q5. A rectangular hole is made in a triangular section as shown in figure. Determine the moment of inertia of the section about X-X axis passing through its centre of gravity and the base BC. (10)



Q6. The flatbed truck, which carries an 80-kg crate, starts from rest and attains a speed of 72 km/h in a distance of 75 m on a level road with constant acceleration. Calculate the work done by the friction force acting on the crate during this interval if the static and kinetic coefficients of friction between the crate and the truck bed are (a) 0.30 and 0.28, respectively, or (b) 0.25 and 0.20, respectively. (10)

Q7. A metal hoop with a radius r = 6 in. is released from rest on the 20° incline. If the coefficients of static and kinetic friction are μ_s= 0.15 and μ_K = 0.12, determine the angular acceleration α of the hoop and the time t for the hoop to move a distance of 10 ft. down the incline. (10)



• Please Revise

Total No. of Pages: 3

Roll No. 0...98.....

THIRD SEMESTER

B.Tech.[EP]

END SEMESTER EXAMINATION

(NOV.-2017)

EP-201 INTRODUCTION TO COMPUTING (NEW SCHEME)

Time: 3 Hours

Max. Marks: 40

Note: Question No. 1. is compulsory. Attempt any four from rest. Use comment line in each program to write the script/function file name.

1. Following commands are written and saved in a Matlab script file. What will the output of this file in the command window? [8]

```
A = [10 20 30 40; 11 22 33 44; 66 77 88 99; 12 24 36 48];
B=rot90(A,3)
C=A([1 3 4], [2 4])
fix([5.3 -6.5])
x=[ 1 5 9 8 ]; y=[ 0 2 7 5 ];
z= x ≥y
a=[10 20 30]; diag(a)
b=0:3:10
c=char('mat','santosh','digital india'); size(c)
d=4 ; disp('d')
```

→ toward zero

2. (a) Explain the following commodes with suitable examples [4]

i. save
ii. fzero
iii. max
iv. meshgrid

(b) It is known that following Leibniz series converges to π/4 and $n \to \infty$

$$S(n) = \sum_{k=0}^{n} (-1)^k \frac{1}{2k+1}$$

Plot the difference between π/4 and sum $S(n)$ versus n for $0 \le n \le 200$. [4]

3. (a) Andrade's equation has been proposed as a model of the effect of temperature on viscosity: $\mu = De^{B/T}$, where μ = dynamic viscosity of water, T = absolute temperature and D and B are the constants. Fit this model to following data for water: and find out the values of unknown constants B and D with proper message. Show necessary mathematical steps required for programming. [4]

T (K)	5	10	15	20	25	30	40
μ (10^{-3} N s/m^2)	1.519	1.307	1.050	1.002	0.85	0.7975	0.6529

(b) For the ideal diode, the voltage V_L across the load R_L is given by

$$V_L = \begin{cases} V_s & V_s > 0 \\ 0 & V_s \le 0 \end{cases}$$

Suppose the supply voltage is

$$V_s(t) = 3e^{-t/3}\sin(\pi t) \text{ volts}$$

where time t in seconds. Write a Matlab program to plot the voltage V_L versus t for $0 \le t \le 20$. [4]

4. Van der Pol's equation has been used to describe many oscillatory processes and is given by following second order differential equation

$$\frac{d^2y}{dt^2} - \mu(1-y^2)\frac{dy}{dt} + y = 0$$

Solve the above differential equation using MATLAB and plot $y(t)$ for μ=1 and $0 \le t \le 20$ using the initial conditions $y(0)=2$ and $\left.\frac{dy}{dt}\right|_{t=0} = 0$. It is necessary to show all required mathematical steps. [8]

5. The force on a sailboat mast can be represented by following function:

$$f(z) = 200\left(\frac{z}{5+z}\right)e^{-2z/H}$$

Where z = the elevation above the deck and H= the height of the mast. The total force exerted on the mast can be determined by integrating this function over the height of the mast:

$F = \int_0^H f(z)dz$. Write a Matlab program to calculate the total force F by computing the integration numerically by using *trapezoidal method* and Matlab inbuilt function. The output should properly display the total Force calculated by both methods and with proper unit. [8]

6. The resistivity of the doped silicon is based on the charge q on an electron, the electron density n, and electron mobility μ. The electron density is given in terms of doping density N and the intrinsic carrier density n_i. The electron mobility is described by the temperature T, the reference temperature T_0, and the reference mobility μ_0. The equation required to compute the resistivity are

$$\rho = \frac{1}{qn\mu}$$

where

$$n = \frac{1}{2}\left(N + \sqrt{N^2 + 4n_i^2}\right) \text{ and } \mu = \mu_0\left(\frac{T}{T_0}\right)^{-2.42}$$

Write a Matlab program to determine N for desired $\rho = 6.5\times10^6$ Vs cm/C using bisection method (given guess/range for $N = 0$ to 2.5×10^{10}).
All the required input parameters should be prompted after executing the program. Also mention the essential mathematical steps. [8]

Total No. of Pages: 1

Roll No. 048..

THIRD SEMESTER

B.Tech (Engineering Physics).

END SEMESTER EXAMINATION

NOV-2017

EP 207 Digital Electronics

Time: 3:00 Hours

Max. Marks: 40

Note: Answer all questions selected any two part from each.
All questions carry equal marks.
Assume suitable missing data, if any.

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1. (a) Convert the following number

(i) $(3287.5100098)_{10} = (?)_8$ (ii) $(675.625)_{10} = (?)_{16}$ (iii) Decimal number 6248 in 2421 code.

(b) Simplify and design the logic circuit

(i) **(A+B)[A'(B'+C')]' + A'B' + A'C'** (ii) **A(A + B) + (B + AA)(A + B)**

(c) Design a combinational circuit that convert 4-bit Grey code to a 4-bit binary number and 4-bit binary to 4-bit Grey.

2. (a) (i) Simplify the following Boolean function using K-map.

F(A,B,C,D) = ∑m (1,4,6,11) + ∑d(0,8,10,12,13)

(ii) **F(A,B,C,D) = ∑m (0,1,2,4,5,6,8,9,12,13,14)**

(b) (i) Realize **AND, OR** and **NOT** gate using **NAND** gate

(ii) Explain briefly about Octal to Binary Encoder.

(c) Explain **BCD** to seven segment display decoder

3. (a) (i) Explain J-K flip-flop and write its all the table.

(ii) Explain Race around condition and master slave Flip Flop

(b) Explain 4-bit synchronous counter using j-k flip flop

(c) Design 4 bit asynchronous counter

4. (a) Explain digital to analog (D/A) converter, weighted resistor D/A converter and R-2R ladder DAC.

(b) (i) What is parallel comparator/flash type ADC ?

(ii) A 3 bit R-2R ladder network has resistor value of R= 10 k and 20k V_{ref} is 8V. What is I_{out} for a digital input of '111'?

(c) (i) Explain briefly SISO resistor

(ii) Design **f(A,B,C,D) = (A+B+C)(AB+CD+BD+AC)** using CMOS.

5. (a) Write short notes on PAL and PLA and explain both with suitable example.

(b) (i) What is Diode ROM explain with an example?

(ii) Explain the following logic function using Diode ROM.

x= ∑m(0,1,3,6,7) y = ∑m(1,2,4,6) z= ∑m(0,1,2,3,6,7) w= ∑m(0,1,3,4,6,7)

(c) Write short notes on TTL and ECL

-END-

Total No. of pages: 4

Roll No. 048.....

THIRD SEMESTER

B.TECH. ()

END SEMESTER EXAMINATION

(NOV-2017)

MG-201 FUNDAMENTALS OF MANAGEMENT

Time: 3 Hours

Max. Marks: 50

Note: Q1 is compulsory and attempt any other three questions out of four.

Q1. Read the following Case and answer the questions that follows:

Nike hit the ground running in 1962. Originally known as Blue Ribbon Sports, the company focused on providing high-quality running shoes designed for athletes by athletes. Founder Philip Knight believed high-tech shoes for runners could be manufactured at competitive prices I imported from abroad. Nike's commitment to designing innovative footwear for serious athletes helped build a cult following among U.S. consumers.

Nike believed in a "pyramid of influence" where the preferences of a small percentage of top athletes influenced the product and brand choices of others. Nike's marketing campaigns have always featured accomplished athletes. For example, runner Steve Prefontaine, the company's first spokesperson, had an irreverent attitude that matched Nike's spirit.

In 1985, Nike signed up then-rookie guard Michael Jordan as a spokesperson. Jordan was still an up-and comer, but he personified superior performance. Nike's bet paid off—the Air Jordan line of basketball shoes flew off the shelves and revenues hit more than $100 million in the first year alone. As one reporter stated, "Few marketers have so reliably been able to identify and sign athletes who transcend their sports to such great effect."

In 1988, Nike aired the first ads in its $20 million "Just Do It" ad campaign. The campaign, which ultimately featured 12 TV spots in all, subtly challenged a generation of athletic enthusiasts to chase their goals. It was a natural manifestation of Nike's attitude of self-empowerment through sports.

As Nike began expanding overseas, the company learned that its U.S.-style ads were seen as too aggressive in Europe, Asia, and South America. Nike realized it

had to "authenticate" its brand in other countries, so it focused on soccer (called football outside the United States) and became active as a sponsor of youth leagues, local clubs, and national teams. However, for Nike to build authenticity among the soccer audience, consumers had to see professional athletes using its product, especially athletes who won.

Nike's big break came in 1994 when the Brazilian team (the only national team for which Nike had any real sponsorship) won the World Cup. That victory transformed Nike's international image from a sneaker company into a brand that represented emotion, allegiance, and identification. Nike's new alliance with soccer helped propel the brand's growth internationally. In 2003, overseas revenues surpassed U.S. revenues for the first time, and in 2007, Nike acquired Umbro, a British maker of soccer-related footwear, apparel, and equipment. The acquisition made Nike the sole supplier to more than 100 professional soccer teams around the world and boosted Nike's international presence and authenticity in soccer. The company sold Umbro in 2012 for $225 million.

In recent years, Nike's international efforts have been focused on emerging markets. During the 2008 Summer Olympics in Beijing, Nike honed in on China and developed an aggressive marketing strategy that countered Adidas's sponsorship of the Olympic Games. Nike received special permission from the International Olympic Committee to run Nike ads featuring Olympic athletes during the games. In addition, Nike sponsored several teams and athletes, including most of the Chinese teams. This aggressive sponsorship strategy helped ignite sales in the Asian region by 15 percent.

In addition to expanding overseas, Nike has successfully expanded its brand into many sports and athletic categories, including footwear, apparel, and equipment. Nike continues to partner with high-profile and influential athletes, coaches, teams, and leagues to build credibility in these categories. For example, Nike aligned with tennis stars Maria Sharapova, Roger Federer, and Rafael Nadal to push its line of tennis clothing and gear. Some called the famous 2008 Wimbledon match between Roger Federer and Rafael Nadal—both dressed in swooshes from head to toe—a five-hour Nike commercial valued at $10.6 million.

To promote its line of basketball shoes and apparel, Nike has partnered with basketball superstars such as Kobe Bryant and LeBron James. In golf, Nike's swoosh appears on many golfers but most famously on Tiger Woods. In the years since Nike first partnered with Woods, Nike Golf has grown into a $523 million business and literally changed the way golfers dress and play today. Tiger's powerful influence on the game and his Nike-emblazoned style has turned the greens at the majors into "golf's fashion runway."

Nike is the biggest sponsor of athletes in the world and plans to spend more than $3 billion in athletic endorsements between 2012 and 2017. The company also has a history of standing by its athletes, such as Tiger Woods and Kobe Bryant, even as they struggle with personal problems. It severed its relationship with Lance Armstrong in 2012, however, after strong evidence showed that the cyclist doped during his time as an athlete and while competing during all Tour de Frances. Nike released a statement explaining,

"Nike does not condone the use of illegal performance enhancing drugs in any manner." Prior to the scandal, the company had helped develop Armstrong's

LIVESTRONG campaign to raise funds for cancer. It designed, manufactured, and sold more than 80 million yellow LIVESTRONG bracelets, netting $500 million for the Lance Armstrong Foundation.

While Nike's athletic endorsements help inspire and reach consumers, its most recent innovations in technology have resulted in more loyal and emotionally connected consumers. For example, Nike's lead in the running category has grown to 60 percent market share thanks to its revolutionary running application and community called Nike+ (plus). Nike+ allows runners to engage in the ultimate running experience by seeing their real-time pace, distance, and route and by giving them coaching tips and online sharing capabilities. Nike expanded Nike+ to focus on key growth areas like basketball and exercise and recently launched Nike+ Basketball, Nike+ Kinect, and Nike+Fuelband, a bracelet/app that tracks daily activities.

Like many companies, Nike is trying to make its company and products more eco-friendly. However, unlike many companies, it does not promote these efforts. One brand consultant explained, "Nike has always been about winning. How is sustainability relevant to its brand?" Nike executives agree that promoting an eco-friendly message would distract from its slick high-tech image, so efforts like recycling old shoes into new shoes are kept quiet.

As a result of its successful expansion across geographic markets and product categories, Nike is the top athletic apparel and footwear manufacturer in the world. In 2014, revenues exceeded $27 billion, and Nike dominated the athletic footwear market with 31 percent market share globally and 50 percent market share in the United States. Swooshes abound on everything from wristwatches to skateboards to

swimming caps. The firm's long-term strategy, however, is focused on running, basketball, football/soccer, men's training, women's training, and action sports.

a. What are the pros, cons, and risks associated with Nike's core marketing strategy?
b. If you were Adidas, how would you compete with Nike? (10+10)

Q.2. Write short notes for any 4 of the following with suitable Examples:

a) Management: Art or Science
b) Unity of Command v/s Unity of Direction
c) Knowledge Management in Corporate Sector
d) Functions of Stock Market
e) Digital India Initiative
f) Differentiate between Sales and Marketing (2.5x4)

Q.3. X Company is engaged in Manufacturing Various Automobile spare parts in India. Should the company spend on various corporate social responsibility activities. If yes, then why and what could be the possible CSR activity. (10)

Q.4.(a) Define Financial Management and discuss the decisions involved in it.
(b)Also examine various sources available for raising capital. (5+5)

Q5. (a)" New products are life and blood of an organization."
Considering above discuss the importance of new product development.
(b) Discuss various stages involved in new product development.

(5+5)

END