INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

Internal Assignment for IIIE Students (Revised Syllabus)

February- 2027 Examination

The Internal Assignment for Basic Industrial Engineering Course will be required to be submitted by those students appearing for February 2027 exam. All eligible students are hereby directed to submit the completed Internal Assignment for the subjects they are appearing for February 2027 exam on or before **10th December 2026**. Assignments are an important aspect of examinations. It is obvious that if you get good marks in assignment your overall percentage shall improve. The weightage for the Internal Assignment will be 20% of the total marks in the respective subject. Internal Assignments are attached below

INSTRUCTIONS FOR INTERNAL ASSIGNMENT

Submission of Assignment is Compulsory. If Assignment not submitted, such students shall be given ZERO (0) marks.

1. **Students have to pass individually total 40 marks in each subject, written exam 80% and in Assignment 20% weightage.**
2. **Assignment is compulsory only for the subject's students appearing for Exam.**
3. **It will be the responsibility of student to appear or not to appear for the written paper if he / She has NOT SUBMITTED ASSIGNMENT in time as per instructions. IIIE shall not be responsible for the consequences.**
4. **Please write carefully your Name, Student membership number, Subject name on each Subject Assignment. Please take printout of first page and fill all details before tape binding the assignment pages.**
5. **It is advised that assignment should be written on the format page given below with this. All assignments to be separately submitted for each subject in a format pages. Write down on both sides of the papers.**
6. **The fees for Internal Assignment will be Rs.200/- per subject. This is to be paid through Demand Draft or Online only (Cheque payment will not be accepted) DD drawn in favour of Indian Institution of Industrial Engineering, payable at Mumbai and sent along with Assignment. Write your name and membership number on the back side of the Demand Draft, Online payment / transaction details should be attached with assignment. Bank details are given below for Online payment.**

   Name of Account: Indian Institution of Industrial Engineering
   Current Bank A/c No.: 00 5320 100000 720
   Bank Name : Bank of India
   Branch: Belapur, Navi Mumbai 400 614
   IFSC : BKID0000053

7. **Solve the questions as per instructions (do not leave any questions or sub questions). Detailed answers are expected. Keep sufficient gap between answers of different questions.**

8. **The paper should be written neat and clean. Leave left margin, top margin and bottom margin. Write up should be legible. Solve all questions sequence wise (from 1 to 7 in ascending order).**
9. **The expected length of the answer shall depend upon the nature of the question.**
10. **Answers shall include the definition, Diagrams, Tables, examples, etc. depending on the nature of the question. Do not waste your time in decorating assignments.**
11. **IE005: Engineering Drawing & Computer Graphics assignment, student may use drawing sheets.**
12. **Content that has been directly copied from each other or the Internet will NOT be accepted.**
13. **Assignments that have been copied and shared among student(s) will be automatically rejected and such students are liable for disqualification.**
14. **Ensure that your answers are according to the marks allocated. Students are advised to check their Assignments thoroughly before submitting the same.**
15. **Late submissions up to 15th December 2026 will be accepted with Rs. 200/- per subject as late fees.**
16. **Beyond 15th December 2026 Internal Assignment will not be accepted.**
17. **It is necessary to keep Xerox Copy of all documents (Assignments and DD) with you for your reference and safety.**
18. **The following Front Cover & second page is Compulsory should be Attached with Each Internal Assignment.**
19. Write page number from first page of Assignment like Page No 1/20, 2/20 etc & assignment to be written on printed format A4 size page only and bind properly.
20. All students are hereby informed that **Internal Assignments must be submitted in tape binding** only. Ensure that the binding is **neat and secure**. Submissions in spiral, stapler, or loose format will not be accepted. Assignments not submitted in tape binding will be considered incomplete.



Sample of Tape Binding

If students still have any doubt, they may call or email their queries to Controller of Examinations, IIIE.

Sd/-
Controller of Examinations

NOTE: DOWNLOAD THE BELOW PAGE FOR WRITING ASSINGMENTS.

STUDENT ASSIGNMENT FOR

FEBRUARY-2027 EXAMINATION

(REVISED SYLLABUS)

Student Name : _____

Membership No. : _____

Section : _____

Subject Code & Name : _____

Assignment Payment Details UTR No. / DD No. _____

Bank Name : _____

Payment Date : _____

Signature of the student with date _____

Student Membership Number-					
QUESTION NO	(a)	(b)	(c)	(d)	TOTAL MARKS (To be filled by Examiner)
CANDIDATE NEED TO TICK IF ATTEMPTED					
1					
2					
3					
4					
5					
6					
7					
TOTAL MARKS: -					

SIGNATURE OF THE EXAMAINER WITH DATE

Student Membership No: **Subject Code & Name :**

Section: Basic Industrial Engineering Course. (February -2027 Exam)

TAPE BINDING

TAPE BINDING

Student Membership No: **Subject Code & Name :**

Section: Basic Industrial Engineering Course. (February -2027 Exam)

Mandatory Format for who have done online payment for Internal Assignments February- 2027 Examination.

- Student Name: _____
- Student Membership No. : S-_____
- Section: _____
- Online Transaction Date: _____
- Amount Transferred (Rs.)_____
- Transaction ID/UTR/UPI/IMPS or Neft No._____
- Total Nos. of Assignments: _____

Important Notice: Transaction details hard copy should be submitted along with Assignment (Don't paste hard copy on Assignment) and soft copy of the same (transaction details) to be sent through e-mail to iiiereceiptdept@gmail.com is compulsory.

Date: -_____ Signature of Student

N.B.: This requirement of account section so please submit properly.

INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA01: Probability & Statistical Techniques

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1	a)	Explain the **fundamentals of probability**, including conditional probability, independence of events, total probability theorem and Bayes' theorem with suitable examples.	(10)
	b)	Define **correlation and regression**. Explain the types of correlation	(10)
Q.2	a)	Explain Time series analysis in fore casting.	(10)
	b)	Explain the Maximum Likelihood Estimation (MLE) method.	(10)
Q.3	a)	Explain the **Chi-square and F-distributions** and their applications in hypothesis testing.	(10)
	b)	Explain the concept of **sampling distributions**.	(10)
Q.4	a)	Explain the **Randomized Block Design (RBD)**.	(10)
	b)	Explain the **Latin Square Design (LSD)** in detail.	(10)
Q.5	a)	Explain the different **methods of representing a time series**.	(10)
	b)	Explain the **Exponential Smoothing Techniques** used in time series analysis.	(10)
Q.6	a)	Explain the **functions of a random variable**. Discuss the transformation of a random variable and explain the method of finding the distribution of a function of a random variable.	(10)
	b)	Explain **two-dimensional random variables**, joint probability distribution, marginal distributions and conditional distributions with suitable examples.	(10)
Q.7	a)	Explain the concept of **Analysis of Variance (ANOVA)**	(10)
	b)	Discuss null and alternative hypotheses, level of significance, critical region, test statistic, and decision-making criteria	(10)

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA02: Operation Research

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1 a) A company produces two types of sauces: A and B. Both these sauces are made by blending two ingredients – X and Y. A certain level of flexibility is permitted in the formulae of these products. Indeed, the restrictions are that (i) B must contain no more than 75 per cent of X, and (ii) A must contain no less than 25 per cent of X, and no less than 50 per cent of Y. Up to 400 kg of X and 300 kg of Y could be purchased. The company can sell as much of these sauces as it produces at a price of Rs 18 for A and Rs 17 for B. The X and Y cost Rs 1.60 and 2.05 per kg, respectively. The company wishes to maximize its net revenue from the sale of these sauces. Formulate and solve this problem as an LP model. (20)

Q.2 a) A fertilizer company distributes its products by trucks that are loaded at its only loading station. Both, company trucks and contractor's trucks are used for this purpose. It was found that on an average, every 5 minutes one truck arrived and the average loading time was 3 minutes. Out of these trucks 40 per cent belong to the contractors. Making suitable assumptions, determine: (a) The probability that a truck has to wait (b) The waiting time of a truck that waits (c) The expected waiting time of customers' trucks per day (20)

Q.3 a) Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and is given in the following table: (10)

JOBS

		I	II	III	IV	V
MEN	A	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find out how men should be assigned the jobs in way that will minimize the total time taken.

b) What is EOQ? What are the different EOQ models? Explain anyone of them. (10)

Q.4 a) Find the optimum solution for the transportation problem by MODI method (20)

	D1	D2	D3	D4	D5	SUPPLY
1	20	18	18	21	19	100
2	21	22	23	20	24	125
3	18	19	21	18	19	175
DEMAND	60	80	85	105	70	Total=400

Q.5 a) A clerk requires on average 3 minutes to serve a customer. Customers arrive every 10 minutes on average. Calculate system utilization, average number in queue and expected waiting time in queue. (10)

b) During peak hours, the interarrival time becomes 4 minutes. Recalculate above measures and interpret results. (10)

Q.6 a) What is the role of operations research in decision-making? Write the advantage and limitations of operations research. (10)

b) The production department of a company requires 3,600 kg of raw material for manufacturing a particular item per year. It has been estimated that the cost of placing an order is Rs 36 and the cost of carrying inventory is 25 per cent of the investment in the inventories. The price is Rs 10 per kg. Help the purchase manager to determine an ordering policy for raw material. (10)

Q.7 a) Discuss the difference between decision-making under certainty, under uncertainty and under risk. (10)

b) Use the graphical method to solve the following LP problem. (10)

Maximize $Z = 15x_1 + 10x_2$

subject to the constraints (i) $4x_1 + 6x_2 \leq 360$, and (ii) $3x_1 + 0x_2 \leq 180$,

(iii) $0x_1 + 5x_2 \leq 200$ $x_1, x_2 \geq 0$.

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA03: Financial Accounting & Costing

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1 a) An investor is considering two financial options: (10)

1. Receive ₹100,000 today.
2. Receive an annuity of ₹25,000 per year at the end of each year for 5 years at a discount rate of 8% per annum.

Calculate the Present Value (PV) and Future Value (FV) of the annuity. Which option should the investor choose based on TVM principles?

b) Explain the primary functions and objectives of Financial Management. Differentiate between Profit Maximization and Wealth Maximization, highlighting the role of risk and return. (10)

Q.2 a) From the following Ledger Balances of M/s TechCorp Ltd. as of March 31, 2026, prepare the Trading Account, Profit & Loss Account, and Balance Sheet: (10)

1.	Capital	₹500,000
2.	Machinery	₹300,000
3.	Opening Stock	₹80,000
4.	Purchases	₹450,000
5.	Sales	₹850,000
6.	Wages	₹60,000
7.	Salaries	₹50,000
8.	Rent	₹24,000
9.	Sundry Debtors	₹120,000
10.	Sundry Creditors	₹74,000
11.	Cash at Bank	₹140,000

Adjustments: Closing Stock is valued at ₹95,000; Outstanding wages amount to ₹10,000; Depreciate Machinery @ 10% p.a.

b) From the financial statements of ABC Ltd., calculate the following financial ratios: (10)

i) Current Ratio & Quick Ratio (Current Assets = ₹300,000, Inventory = ₹100,000, Prepaid Expenses = ₹20,000, Current Liabilities = ₹160,000).

ii) Gross Profit Ratio & Net Profit Ratio (Sales = ₹1,000,000, Cost of Goods Sold = ₹600,000, Operating Expenses = ₹150,000)

Q.3 a) Zenith Industries is evaluating a new manufacturing project requiring an initial outlay of ₹2,000,000. The expected net cash inflows over its 5-year life are as follows: (10)

Year 1	Year 2	Year 3	Year 4	Year 5
₹500,000	₹600,000	₹700,000	₹600,000	₹400,000

Assuming a cost of capital (discount rate) of 10% per annum, calculate:

1. Payback Period
2. Net Present Value (NPV)
3. Profitability Index (PI)

b) Discuss the major long-term and short-term sources of finance available to an industrial unit. Briefly explain the structure and functions of Money Markets, Capital Markets, and the regulatory role of SEBI. (10)

Q.4 a) A factory has three production departments (P1, P2, P3) and two service departments (S1, S2). (10)

Primary Distribution of Overheads				
P1	P2	P3	S1	S2
₹120,000	₹100,000	₹80,000	₹30,000	₹20,000

The service department overheads are to be apportioned based on the following percentages:

- S1 distributes to P1 (40%), P2 (30%), P3 (20%), S2 (10%)
- S2 distributes to P1 (30%), P2 (40%), P3 (20%), S1 (10%)

Apportion the service department costs to production departments using the Repeated Distribution Method.

b) Product 'X' passes through two distinct processes: Process 1 and Process 2. (10)

For Process 1, 10,000 units were introduced at ₹10 per unit.

- Additional Direct Materials: ₹20,000; Direct Labor: ₹30,000; Overheads: ₹10,000
- Normal Loss is 5% of input, and scrap value per unit is ₹2.
- Actual output transferred to Process 2 is 9,300 units.

Prepare the Process Account for Process 1 and compute the Abnormal Loss/Gain Account.

Q.5 a) Alpha Manufacturing Ltd. produces a single item with the following cost structure: (10)

Selling Price per unit: ₹250 Variable

Cost per unit: ₹150

Total Annual Fixed Costs: ₹600,000

Calculate:

1. P/V Ratio and Break-Even Point (in units and in sales value)
2. Sales volume required to earn a target profit of ₹300,000
3. Margin of Safety (in units and rupees) if current sales are 10,000 units

b) The standard material required for producing 1 unit of Product 'Y' is 10 kg at ₹20 per kg. During a period, 500 units were produced using 5,200 kg of material at a total cost of ₹114,400. (10)

Calculate:

1. Direct Material Cost Variance (DMCV)
2. Direct Material Price Variance (DMPV)
3. Direct Material Usage Variance (DMUV)

Q.6 a) A machine was purchased on April 1, 2023, for ₹500,000 with an estimated scrap value of ₹50,000 after 5 years. Compare the depreciation charged for the first 3 years under: (10)

1. Straight-Line Method (SLM)
2. Written Down Value (WDV) Method @ 20% p.a.

Show the Machinery Account for 3 years under the WDV method and explain the tax implications of depreciation policies.

b) Prepare a Cash Budget for M/s Apex Tools for the months of April, May, and June 2026 from the following details: (10)

Opening Cash Balance On April 1			₹100,000
	Sales	Purchases	
Feb	₹200,000		
March	₹220,000		
April	₹250,000	₹150,000	
May	₹300,000	₹180,000	
June	₹280,000 (50% of sales are cash, remaining collection in the next month)	₹160,000 (Paid 1 month after purchase)	

Monthly Fixed Expenses=₹30,000 (Paid in the same month)

Q.7 a) Differentiate between GAAP and IFRS framework. Explain the necessity of harmonizing global accounting standard reporting for multinational enterprises. (10)

b) Write detailed notes on: (10)

1. Green Accounting: Concepts, metrics, and application in corporate sustainability evaluation.

2. Cost Reduction vs. Cost Control: Key tools, techniques, and impact on productivity enhancement.

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA04: Principles of Management

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1	a)	Describe Evolution of scientific management and Theory of Management.	(10)
	b)	Write note on i) Managerial ethics ii) Corporate social responsibility	(10)
Q.2	a)	Describe "The Indian Contract Act, 1872" in the realm of Formation of valid contract	(10)
	b)	Differentiate between Co-operative organizations and Public sector organizations.	(10)
Q.3	a)	Explain Principles of Human Resource Management.	(10)
	b)	Describe Purpose and Methods of 'Training'	(10)
Q.4	a)	Write note on 'Modern concepts of marketing'	(10)
	b)	Describe stepwise process of 'New Product launching'	(10)
Q.5	a)	Explain Functions of finance department.	(10)
	b)	Write note on 'Profit and Loss A/c and Balance sheet'	(10)
Q.6	a)	Explain strategies of Sales promotion	(10)
	b)	Describe Performance Appraisal Procedure	(10)
Q.7	a)	Describe some Motivational Theories of Management	(10)
	b)	Write note on 'Joint stock companies'	(10)

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA05: Human Factors in Engineering

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1	a)	Describe the Skill-Rule-Knowledge (SRK) model and differentiate between the types of human mistakes.	(10)
	b)	Analyze how posture, force, and time interact to influence physical loading on a worker in industrial plants.	(10)
Q.2	a)	Explain how Design For Assembly (DFA) and manufacturing fixtures act as cognitive support for production line operators.	(10)
	b)	Explain how Poka-Yoke and Standardized Work Instructions support cognitive ergonomics in production lines.	(10)
Q.3	a)	Describe in brief the human anatomy. Enlist the common injuries associated with the human back and neck complexes. State the impact of posture on these complexes.	(10)
	b)	Discuss the principles of designing for the extremes and designing for adjustability with suitable example of each.	(10)
Q.4	a)	Justify with example: Maintaining a static posture over an extended time impacts muscle fatigue and injury risks.	(10)
	b)	Explain in brief the legal responsibilities of a production engineer regarding workplace safety guidelines and official ergonomic regulations.	(10)
Q.5	a)	Define Musculo-Skeletal Disorders (MSDs) and discuss their impact on industrial productivity.	(10)
	b)	Describe the standard methods and global datasets used for measuring human body dimensions.	(10)
Q.6	a)	Differentiate between Static and Dynamic anthropometric measurements, providing appropriate examples for each.	(10)
	b)	Explain the purpose and methodology of conducting a Heuristic Evaluation (HE) in workplace design.	(10)
Q.7	a)	Highlight and discuss the significance of legal provisions and guidelines such as the Swedish AFS provisions.	(10)
	b)	Explain the historical development of ergonomics and its connection to modern engineering applications.	(10)

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA06: Manufacturing Technology

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1	a)	Explain the term "pattern" in sand casting. List and describe any four types of pattern allowances with suitable examples.	(10)
	b)	Explain the working principles of Resistance welding and Thermit welding. Also, state the surface preparation requirements for these welding processes	(10)
Q.2	a)	Discuss the design considerations for welded joints. Outline various types of defects occurring in welded joints along with their respective remedies.	(10)
	b)	Compare Die casting, Investment casting, and Centrifugal casting processes on the basis of their working principles, applications, and types of materials cast.	(10)
Q.3	a)	Explain tool geometry and tool materials. Discuss Merchant's analysis for the mechanics of turning along with the phenomenon of tool wear and tool life.	(10)
	b)	Classify the different types of sheet metal operations and explain the materials commonly used for manufacturing dies and punches.	(10)
Q.4	a)	Explain the step-by-step design procedure for Progressive dies and Drawing dies. Discuss how clearance analysis and strip layout are carried out.	(10)
	b)	Explain the cooling and solidification process in casting along with the method of solidification time estimation.	(10)
Q.5	a)	Discuss the need and classification of modern manufacturing methods. Explain the working of Wire Electric Discharge Machining (W-EDM) .	(10)
	b)	Explain the working principles of Mechanical, Electrical, and Pneumatic comparators. Describe the primary considerations involved in gauge design.	(10)
Q.6	a)	Explain the working principles, process parameters, and applications of Electrochemical Machining (ECM) and Laser Beam Machining (LBM).	(10)
	b)	Explain how center of pressure, blank size determination, and sheet utilization ratio are calculated. Discuss various methods used for reducing cutting forces in sheet metal operations.	(10)
Q.7	a)	Explain the need, evolution, and role of Computer Integrated Manufacturing (CIM).	(10)
	b)	Explain tool geometry and tool materials. Discuss Merchant's analysis for the mechanics of turning along with the phenomenon of tool wear and tool life.	(10)

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA07: Industrial Automation & Robotics

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1 a) What does "automation" mean? Discuss the core elements of automation. (10)

b) What do you mean by Intelligent System? Discuss the core characteristics of intelligent systems. Discuss the types of Intelligent Agents. (10)

Q.2 a) Discuss the cascade method and shift register method used in industrial pneumatics to design sequence circuits. (10)

b) Write short notes on: (10)
   i) Electro-pneumatic Circuit
   ii) PLC discrete control system

Q.3 a) Discuss the various types of robots used in manufacturing industry. (10)

b) Write short notes on: (10)
   i) Point to Point robot feedback control
   ii) Significance of Degrees of Freedom in robotics

Q.4 a) Discuss with examples, Uninformed and informed search methods for problem solving. (10)

b) What do you mean by Learning with Decision Tree? Discuss the Classification and Regression Trees (CART) machine learning algorithm for building decision trees. (10)

Q.5 a) Discuss Linear regression and Logistic regression in Machine Learning. (10)

b) Discuss the role of Natural Language Processing and Deep learning in automation domain. (10)

Q.6 a) What does Machine learning mean? Discuss supervised, unsupervised and reinforcement learning. (10)

b) Write short notes on: (10)
   i) Relevance of Artificial Intelligence to Mechanical Engineering
   ii) Genetic Algorithms

Q.7 a) Discuss the core technologies driving Industry 4.0. what is a dark factory? (10)

b) Discuss Artificial Neural Network. With a neat sketch, discuss the three layers in an Artificial Neural Network. (10)

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INDIAN INSTITUTION OF INDUSTRIAL ENGINEERING

GRADUATESHIP EXAMINATION

Internal Assignment for February-2027

Basic Industrial Engineering Course

IEA08: Economics and Indian Economic Environment

Max. Marks: 140

Instruction: All questions are compulsory.

Q.1	a)	Explain need hierarchy and wants in detail.	(10)
	b)	What is utility? Explain the law of diminishing marginal utility.	(10)
Q.2	a)	What is national income? What are difficulties in calculation of national income?	(10)
	b)	Explain product method and income method of measuring national income.	(10)
Q.3	a)	How income determination is done? Explain saving and investment functions.	(10)
	b)	What is the difference under-employment and unemployment? What are the measures to resolve unemployment issues?	(10)
Q.4	a)	What are the various indicators of economic development? Enlist the characteristics of small and medium scale industries.	(10)
	b)	What are the basic features of Indian economy? Explain the effect of population on economic growth	(10)
Q.5	a)	Explain the concept of productivity and agriculture inputs	(10)
	b)	What is co-operative movement? What is its impact on agriculture and agro based Industries.	(10)
Q.6	a)	What is the difference between public sector and private sector industries?	(10)
	b)	What is the process of economic growth? What are the government policies for SSE/MSMES?	(10)
Q.7	a)	Explain the significance of Infrastructure in India.	(10)
	b)	Explain in detail full and partial employment.	(10)

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