ELECTRICA MAGAZINE

ELECTRICAL ENGINEERING DEPARTMENT

MGM's POLYTECHNIC, AURANGABAD

Academic Year: 2017-18, 20-02-2018

VISION

To develop competent electrical engineer acting as an asset for industry and society

MISSION

- To disseminate knowledge by providing curricular and co-curricular activity
- To create technical manpower by interacting with industry
- To enrich the students with social awareness to serve the society.

What is in this issue?

RESEARCH ACTIVITY IN DEPARTMENT

Single Phase to Three Phase System Using Dual Boost Converter to Drive Induction Motor Along With Active Power Factor Correction Technique

Abstract:
This paper offerings a single-phase to three-phase drive system composed of dual boost converter, three phase PWM inverter plus an Induction motor. It gives comparisons between boost and dual boost converter topology. The proposed system permits enhancements of power factor and sinusoidal input current at the terminal of single phase source by using current control mode with speed control of three phase induction motor using v/f method. Such a single phase to three phase conversion technique has large range of application from rural area to industrial area where three phase machines work easily on available single phase suppl. Finally a MATLAB simulation based model is developed for single phase to three phase system and simulation results are present

Prof. Y. U. Rathod
(H.O.D.)
Electrical Engineering

"Engineering is not only study of 45 subjects but it is moral studies of intellectual life"- Prakhar Srivastav

Single Phase to Three Phase System Using Dual Boost Converter to Drive Induction Motor Along With Active Power Factor Correction Technique

Abstract:
Static phase converters, as the name implies, have no moving parts other than switching relays which operate during the starting of the three-phase motor. This is also called a capacitor-only phase converter. It is the least expensive and simplest kind of converter. Two of the three phases motor leads are connected directly to the single-phase line. The third lead of the motor is connected to one of the single-phase through a bank of oil capacitors. The capacitors shift the phase of the voltage to the third winding. The phase-shifted voltage in combination with the physical position of the motor windings produces the rotating magnetic field to start and run the motor

Prof. Y. U. Rathod
(H.O.D.)
Electrical Engineering

Prof. S. S. More
(Lecturer)
Electrical Engineering

Three Phase Fault Analysis Auto-reset On Temporary Fault Or Permanent Trip

Abstract:

The project is intended to improve an automatic tripping mechanism for the three phase supply system. The project output resets automatically after a brief stoppage in the event short-term fault while it remains in tripped condition in case of long-lasting fault. The electrical substation which supply the power to the consumers i.e. industries or domestic can have failures due to some faults which can be short-term or long-lasting.

These faults lead to considerable damage to the power system equipment. In India it is common to witness the let-downs in supply system due to the faults that occur during the transmission or distribution. The errors might be LG (Line to Ground), LL (Line to Line), 3L (Three lines) in the supply systems and these errors in three phase supply system can affect the power system. To stunned this problem a system is built, which can sense these errors and automatically separates the supply to avoid large scale impairment to the control gears in the grid sub-stations.

This scheme is built using three single phase transformers which are wired in star input and star output, and 3 transformers are connected in delta networks, having input 220 volt and output at 12 volt. This idea low voltage testing of fault conditions is followed as it is not suitable to create on mains line. 555 timers are used for handling short period and long period error conditions. A set of switches are used to make the LL, LG and 3L fault in low voltage side, for activating the falling mechanism. Short period fault returns the supply to the load instantaneously called as temporary trip while long period shall result in permanent trip. The idea in the future can be extended to developing a device to send message to the authorities via SMS by interfacing a GSM modem.**[1]**

Prof. Y. U. Rathod
(H.O.D.)
Electrical Engineering

Prof. M. M. Bharsakhale
(Lecturer)
Electrical Engineering

"Engineers like to solve problems. If there are no problems handily available, they will create their own problems"-Scott Adams

Digital Synthetic Ripple Modulator for DCDC Converter

Abstract:

Synthetic ripple modulation (SRM) involves the generation of an artificial ripple me of carrier signal generation for PWM control enables voltage-hysteretic modulation to be achieved in the low-voltage VRM modules for microprocessors. With the inherent low-voltage ripple exhibited by a low-voltage VRM that is insufficient for conventional hysteretic operation, the SRM scheme on the other hand provides sufficient ripple for the PWM carrier signal. The SRM scheme blends in the advantages of current-mode control and hysteretic control providing superior transient performance

Prof. M. M. Bhavsar
(Lecturer)
Electrical Engineering

Digital synthetic ripple modulation technique for DC-DC converter by using FPGA controller Modulation technique for synchronous buck converter by using FPGA controller

Abstract:

Voltage regulator modules (VRMs) powering the microprocessors are required to fulfill the stringent specifications on the core voltage ripple and voltage regulation. These specifications are accomplished by the microprocessor's higher di/dt requirements and the need to operate at a lower level of supply voltage for reduced power consumption. The VRMs resort to multi-phase pulse width modulation (PWM) control scheme to the high current demands and provide balanced load current sharing. The control schemes also involve a combination of voltage-mode and current-mode or current-mode and hysteretic-mode control. Thus, these schemes add to the cost and complexity of the VRM.

The digital SRM (DSRM) scheme employed in the control of the buck converter also involves a novel method for deriving the duty ratio, with the generated time-intervals inversely related to a sampled converter parameter. The duty ratio generation scheme is based on a unique scaling process and eliminates the need for a high clock frequency. The modulation scheme utilizes the sampled inductor voltage, which is scaled and successively accumulated to generate the synthetic ripple. The error in the output voltage when compared to a reference or command voltage is added to the synthetic ripple resulting in the carrier signal for PWM operation. The carrier signal is modulated between the hysteretic limits of output, resulting in the required duty ratio. Since the carrier signal involved in the PWM signal generation is derived from the converter parameters in the SRM scheme, natural input feed-forward control is also attained. This enables better rejection of line input disturbances.

Prof. M. M. Bhavsar
(Lecturer)
Electrical Engineering

"Math is my Passion. Engineering is my Profession" - Wilfred James Dolor

Digital synthetic ripple modulator for DC-DC converter

Abstract:

The digital control based synthetic ripple modulator generates the duty ratio with inverse relation to a sampled converter parameter. The on-time and off-time duration of the switches forming the duty ratio is generated by successively accumulating the sampled inductor voltage. The accumulated output forming the synthetic ripple is added to the error between output voltage and reference voltage which act like feed forward system. The carrier signal thus generated is modulated between the higher and lower hysteretic thresholds, thus generating the duty ratio. A scaling process also allows the implementation of programmable switching frequency for synchronous buck converter.

Prof. M. M. Bhavsar
(Lecturer)
Electrical Engineering

FACULTY DEVOLOPMENT PROGRAM (FDP)

FDP LOCATION: K. K. WAGH POLYTECHNIC, NASHIK

DATE & SHEDULE: 2-1-2018 To 6-1-2018 (5 DAYS)

FDP TOPIC: INTRODUCTION TO ELECTRICAL SOFTWARE'S

LEARNING OBJECTIVES:

- To learn various recent software's used in electrical engineering and technology for simulation, practical performance modeling as well as logic based programing of software

FACULTY DEVOLOPMENT PROGRAM (FDP)

FDP LOCATION: GOVERNMENT POLYTECHNIC, NAGPUR

DATE & SHEDULE: 8-1-2018 To 12-1-2018 (5 DAYS)

FDP TOPIC: RECENT TRENDS IN RENEWABLE ENERGY SOURCES

LEARNING OBJECTIVES:

- Identify need and importance of renewable energy sources like solar photovoltaic, solar thermal, wind energy, biomass energy, etc.
- Apply concept of renewable energy for energy generation

INDUSTRIAL VISIT

VISIT LOCATION: SOLAR STATION AT JNEC, MGM CAMPUS

DATE & SHEDULE: 22-7-2017 (1 DAYS)

LEARNING OBJECTIVES:

- Identify need and importance of renewable energy sources like solar photovoltaic, solar thermal, etc.
- Apply concept of renewable energy for energy generation
- Generation of electricity with one time investment with minimum running expense & Low maintenance cost at running period.

INDUSTRIAL VISIT

VISIT LOCATION: KHADI CENTER AT JNEC, MGM CAMPUS

DATE & SHEDULE: 27-7-2017 (1 DAYS)

LEARNING OBJECTIVES:

- Different process of textile industries
- Process of making paithanies

INDUSTRIAL VISIT

VISIT LOCATION: MGM's GOKSHEER, PADEGAON, AURANGABAD

DATE & SHEDULE: 19-8-2017 (1 DAYS)

LEARNING OBJECTIVES:

- Process of packing milk bags using PLC program automated system.
- Know about biogas electricity generation plant.
- New concepts of business and management.

INDUSTRIAL VISIT

VISIT LOCATION: PRECISION POWER PRODUCT, MIDC, WALUJ, A'BAD

DATE & SHEDULE: 24-1-2018 (1 DAYS)

LEARNING OBJECTIVES:

- Study of different type of instrument in instrumentation system
- Study of transducer & Sensor
-
- Process of calibration

INDUSTRIAL VISIT

VISIT LOCATION: 220kV, MSETCL, SUBSTATION, NEWASA (Bhenda), A'Nagar

DATE & SHEDULE: 29-1-2018 (1 DAYS)

LEARNING OBJECTIVES:

- Study of C.T. & P.T. & various protection devices
- Process of Primary & Secondary transmission

EXPERT LECTURE TALK

LECTURE TALK TOPIC: ELECTRICAL SAFAETY

DATE & SHEDULE: 1-8-2017 (1 DAYS)

LEARNING OBJECTIVES:

- To know about Electrical Safety Norms
- Study of Protective devices
- Causes of electrical accident and their precaution

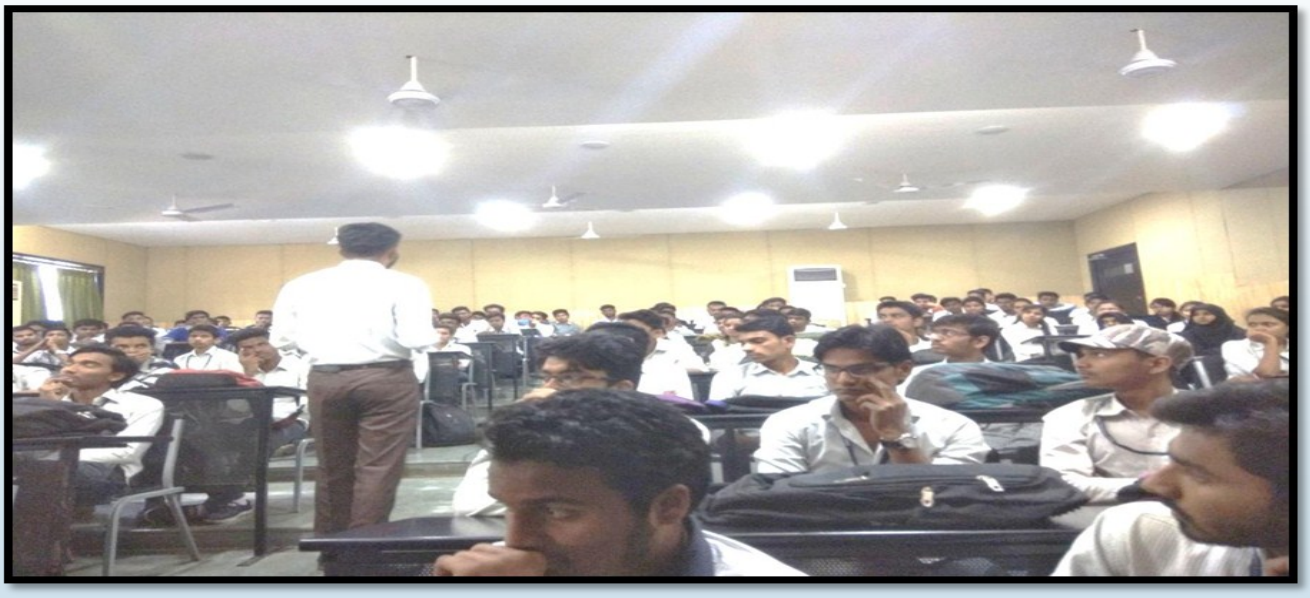
EXPERT LECTURE TALK

LECTURE TALK TOPIC: SAP TRAINING PROGRAM

DATE & SHEDULE: 22-1-2018 (1 DAYS)

LEARNING OBJECTIVES:

- Role of SAP (Systems, Applications & Products in Data Processing) in engineering field.



EXPERT LECTURE TALK

LECTURE TALK TOPIC: ELECTRICAL PANNEL & MOTOR STARTER

DATE & SHEDULE: 5-2-2018 (1 DAYS)

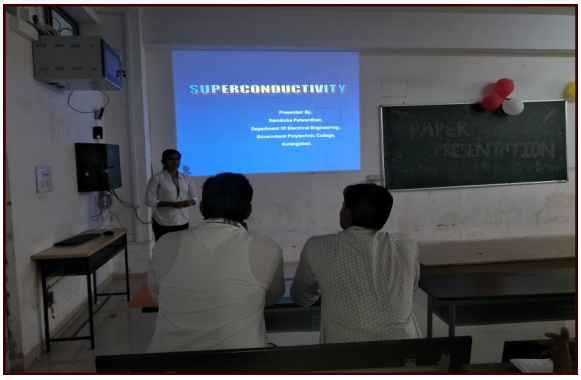
LEARNING OBJECTIVES:

- To know about various tools used in Panel designing.
- Study of various motor starter used in industrial application

VISIO POLYTECH 2K18

TECHNICAL QUIZ COMPETITION

POSTER PRESENTATION COMPETITION



PAPER PRESENTATION COMPETITION

PROJECT COMPETITION

SARSWATI PUJAN OF EVENT

It is a state level technical event in which every year we organize various technical events. This year Visio-Polytech 2K18 consist of Four events in department namely Project Competition, Paper Presentation, Poster Presentation, Quiz Competition.

This event is specially designed for Junior college, ITI and Polytechnic students. This event helps to bring the students together across the state and promotes innovative and latent qualities in them. Visio-Polytech 2k18 is a platform where students pave ways to their creativity by showing their presentation skills.

TECHNICAL ARTICLE'S

Georg Ohm's Discoveries

Georg Ohm, German mathematician and physicist, began his important publications in 1825. In his first paper published in 1825, Ohm examines the decrease in the electromagnetic force produced by a wire as the length of the wire increased. The paper deduced mathematical relationships based purely on the experimental evidence that Ohm had tabulated

In two important papers in 1826, Ohm gave a mathematical description of conduction in circuits modelled on Fourier's study of heat conduction. These papers continue Ohm's deduction of results from experimental evidence and, particularly in the second, he was able to propose laws which went a long way to explaining results of others working on galvanic electricity. The second paper certainly is the first step in a comprehensive theory which Ohm was able to give in his famous book published in the following year

What is now known as Ohm's law appeared in this famous book **Die galvanische Kette, mathematisch bearbeitet (1827)** in which he gave his complete theory of electricity. The book begins with the mathematical background necessary for an understanding of the rest of the work. We should remark here that such a mathematical background was necessary for even the leading German physicists to understand the work, for the emphasis at this time was on a non-mathematical approach to physics. We should also remark that, despite Ohm's attempts in this introduction, he was not really successful in convincing the older German physicists that the mathematical approach was the right one. As stated above, this work included "Ohm's Law" theory: The relationship of a current passing through most materials is directly proportional to the potential difference applied across the material

Although Ohm's work strongly influenced theory, at first it was received with little enthusiasm. However, his work was eventually recognized by the Royal Society with its award of the Copley Medal in 1841. He became a foreign member of the Royal Society in 1842, and in 1845 he became a full member of the Bavarian Academy.

Gauraw R. More (35217) - EE Third Year

TECHNICAL ARTICLE'S

माइकेल फैराडे

माइकेल फैराडे, अंग्रेज भौतिक विज्ञानी एवं रसायनज्ञ थे। उन्होने विद्युत-धारा के चुम्बकीय प्रभाव का आविष्कार किया। उसने विद्युतचुम्बकीय प्रेरण का अध्ययन करके उसको नियमवद्ध किया। इससे डायनेमों तथा विद्युत मोटर का निर्माण हुआ। बाद में मैक्सवेल **Maxwell** के विद्युतचुम्बकत्व के चार समीकरणों में फैराडे का यह नियम भी सम्मिलित हुआ। फैराडे ने विद्युत रसायन पर भी बहुत काम किया और इससे सम्बन्धित अपने दो नियम दिये।

माइकल फैराडे का जन्म 22 सितंबर 1791 ई. को हुआ। इनके पिता बहुत गरीब थे और लुहारी का कार्य करते थे। इन्होंने अपना जीवन लंदन में जिल्दसाज की नौकरी से प्रारंभ किया। समय मिलने पर रसायन एव विद्युत् भौतिकी पर पुस्तकें पढ़ते रहते थे। सन् 1813 ई. में प्रसिद्ध रसायनज्ञ, सर हंफ्री डेबी, के व्याख्यान सुनने का इन्हें सौभाग्य प्राप्त हुआ। इन व्याख्यानों पर फैराडे ने टिप्पणियाँ लिखीं और डेबी के पास भेजीं। सर हंफ्री डेबी इन टिप्पणियों से बड़े प्रभावित हुए और अपनी अनुसंधानशाला में इन्हें अपना सहयोगी बना लिया। फैराडे ने लगन के साथ कार्य किया और निरंतर प्रगति कर सन् 1833 में रॉयल इंस्टिट्यूट में रसायन के प्राध्यापक हो गए।

अपने जीवनकाल में फैराडे ने अनेक खोजें कीं। सन् 1831 में विद्युच्चुंबकीय प्रेरण के सिद्धांत की महत्वपूर्ण खोज की। चुंबकीय क्षेत्र में एक चालक को घुमाकर विद्युत्-वाहक-बल उत्पन्न किया। इस सिद्धांत पर भविष्य में जनित्र (**generator**) वना तथा आधुनिक विद्युत् इंजीनियरी की नींव पड़ी। इन्होंने विद्युद्विश्लेषण पर महत्वपूर्ण कार्य किए तथा विद्युद्विश्लेषण के नियमों की स्थापना की, जो फैराडे के नियम कहलाते हैं। विद्युद्विश्लेषण में जिन तकनीकी शब्दों का उपयोग किया जाता है, उनका नामकरण भी फैराडे ने ही किया। क्लोरीन गैस का द्रवीकरण करने में भी ये सफल हुए। परावैद्युतांक, प्राणिविद्युत्, चुंबकीय क्षेत्र में रेखा ध्रुवित प्रकाश का घुमाव, आदि विषयों में भी फैराडे ने योगदान किया। आपने अनेक पुस्तकें लिखीं, जिनमें सबसे उपयोगी पुस्तक "विद्युत् में प्रायोगिक गवेषणाएँ" (**Experimental Researches in Electricity**) है।

फैराडे जीवन भर अपने कार्य में रत रहे। ये इतने नम्र थे कि इन्होंने कोई पदवी या उपाधि स्वीकार न की। रायल सोसायटी के अध्यक्ष पद को भी अस्वीकृत कर दिया। धुन एवं लगन से कार्य कर, महान वैज्ञानिक सफलता प्राप्त करने का इससे अच्छा उदाहरण वैज्ञानिक इतिहास में न मिलेगा। हर फ्री डेवी भी फैराडे को अपनी सबसे बड़ी खोज मानते थे. माइकल फैराडे की मृत्यु 25 अगस्त 1867 ई. को हुई।

Shrirang Bhalerao (35216) - EE Third Year

TECHNICAL ARTICLE'S

Alessandro Volta

Alessandro Volta, in full **Conte Alessandro Giuseppe Antonio Anastasio Volta**, (born February 18, 1745, Como, Lombardy [Italy]—died March 5, 1827, Como), Italian physicist whose invention of the electric battery provided the first source of continuous current.

Volta became professor of physics at the Royal School of Como in 1774. In 1775 his interest in electricityled him to improve the electrophorus, a device used to generate static electricity. He discovered and isolated methane gas in 1776. Three years later he was appointed to the chair of physics at the University of Pavia.

In 1791 Volta's friend Luigi Galvani announced that the contact of two different metals with the muscle of a frog resulted in the generation of an electric current. Galvani interpreted that as a new form of electricity found in living tissue, which he called "animal electricity." Volta felt that the frog merely conducted a current that flowed between the two metals, which he called "metallic electricity." He began experimenting in 1792 with metals alone. (He would detect the weak flow of electricity between disks of different metals by placing them on his tongue.) Volta found that animal tissue was not needed to produce a current. That provoked much controversy between the animal-electricity adherents and the metallic-electricity advocates, but, with his announcement of the first electric battery in 1800, victory was assured for Volta. Known as the voltaic pile or the voltaic column, Volta's battery consisted of alternating disks of zincand silver (or copper and pewter) separated by paper or cloth soaked either in salt water or sodiumhydroxide.

A simple and reliable source of electric current that did not need to be recharged like the Leyden jar, his invention quickly led to a new wave of electrical experiments. Within six weeks of Volta's announcement, English scientists William Nicholson and Anthony Carlisle used a voltaic pile to decompose water into hydrogen and oxygen, thus discovering electrolysis (how an electric current leads to a chemical reaction) and creating the field of electrochemistry.

Nikita H. Somaiyya (25122)- EE Second Year

TECHNICAL ARTICLE'S

Joseph Henry

Joseph Henry, (born December 17, 1797, Albany, New York, U.S.—died May 13, 1878, Washington, D.C.), one of the first great American scientists after Benjamin Franklin. He aided and discovered several important principles of electricity, including self-induction, a phenomenon of primary importance in electronic circuitry.

Henry also searched for electromagnetic induction—the process of converting magnetism into electricity and in 1831 he started building a large electromagnet for that purpose. Because the room at the Albany Academy in which he wanted to build his experiment was not available, he had to postpone his work until June 1832, when he learned that British physicist Michael Faraday had already discovered induction the previous year. However, when he resumed his experiments, he was the first to notice the principle of self-induction.

In 1831 Henry built and successfully operated, over a distance of 2.4 km (1.5 miles), a telegraph of his own design. He became professor of natural philosophy at the College of New Jersey (later Princeton University) in 1832. Continuing his researches, he discovered the laws upon which the transformer is based. He also found that currents could be induced at a distance and in one case magnetized a needle by using a lightning flash 13 km (8 miles) away. That experiment was apparently the first use of radio waves across a distance. He aided Samuel F.B. Morse in the development of the telegraph by giving him 8 km (5 miles) of copper wire and writing a letter to Congress in 1842 encouraging it to support an 80-km (50-mile) test line. By using a thermo galvanometer, a heat-detection device, he showed that sunspots radiate less heat than the general solar surface.

In 1846 Henry became the first secretary of the Smithsonian Institution, Washington, D.C., where he organized and supported a corps of volunteer weather observers. The success of the Smithsonian meteorological work led to the creation of the U.S. Weather Bureau (later Service). One of Lincoln'schief technical advisers during the U.S. Civil War, he was a primary organizer of the National Academy of Sciences and its second president. In 1893 his name was given to the standard electrical unit of inductive resistance, the henry.

Pallavi N. Bhume (25144) - EE Second Year

TECHNICAL ARTICLE'S

Andre-Marie Ampere

André-Marie Ampère (1775-1836), a French physicist, founded the science of electrodynamics now known as electromagnetism.

Danish physicist Hans Christian Orsted discovered, accidentally, in 1820 that a magnetic needle is deflected when the current in a nearby wire varies - a phenomenon establishing a relationship between electricity and magnetism. During September and October 1820, Ampère, influenced by Orsted's discovery, performed a series of experiments designed to elucidate the exact nature of the relationship between electric current-flow and magnetism, as well as the relationships governing the behavior of electric currents in various types of conductors. Among others, Ampère showed that two parallel wires carrying electric currents magnetically attract each other if the currents are in the same direction and repel if the currents are in opposite directions.

This experiments led Ampère to formulate his famous law of electromagnetism, called after him Ampère's law, that describes mathematically the magnetic force between two electrical currents.

His investigations, reported weekly before the Académie des Sciences, established the new science of electrodynamics.

He was also first person to develop measuring techniques for electricity in order to perform his experiments. Ampère built an instrument utilizing a free moving magnetized needle (a compass) to measure the flow of electricity. The later refinement of this instrument is known as galvanometer. Basically, a simple modern galvanometer is an instrument where a free pivoting coil and an attached needle are placed in the magnetic field of a permanent magnet. When an electric current is passed through the coil it experiences a torque due to the interaction of the current with the magnetic field. As a result the coil pivots and the needle is deflected proportionally to the current passing through the coil.

The unit of electric current is ampere, is called after Andre-Marie Ampere.

Jayashri T. Ramdasi (25118) - EE Second Year

STUDENTS MAGAZINE COMMITTEE

FACULTY MAGAZINE COMMITTEE

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Ω THANK YOU Ω